THE MAGAZINE DESIGNED FOR ALL RAILROAD HOBBYISTS

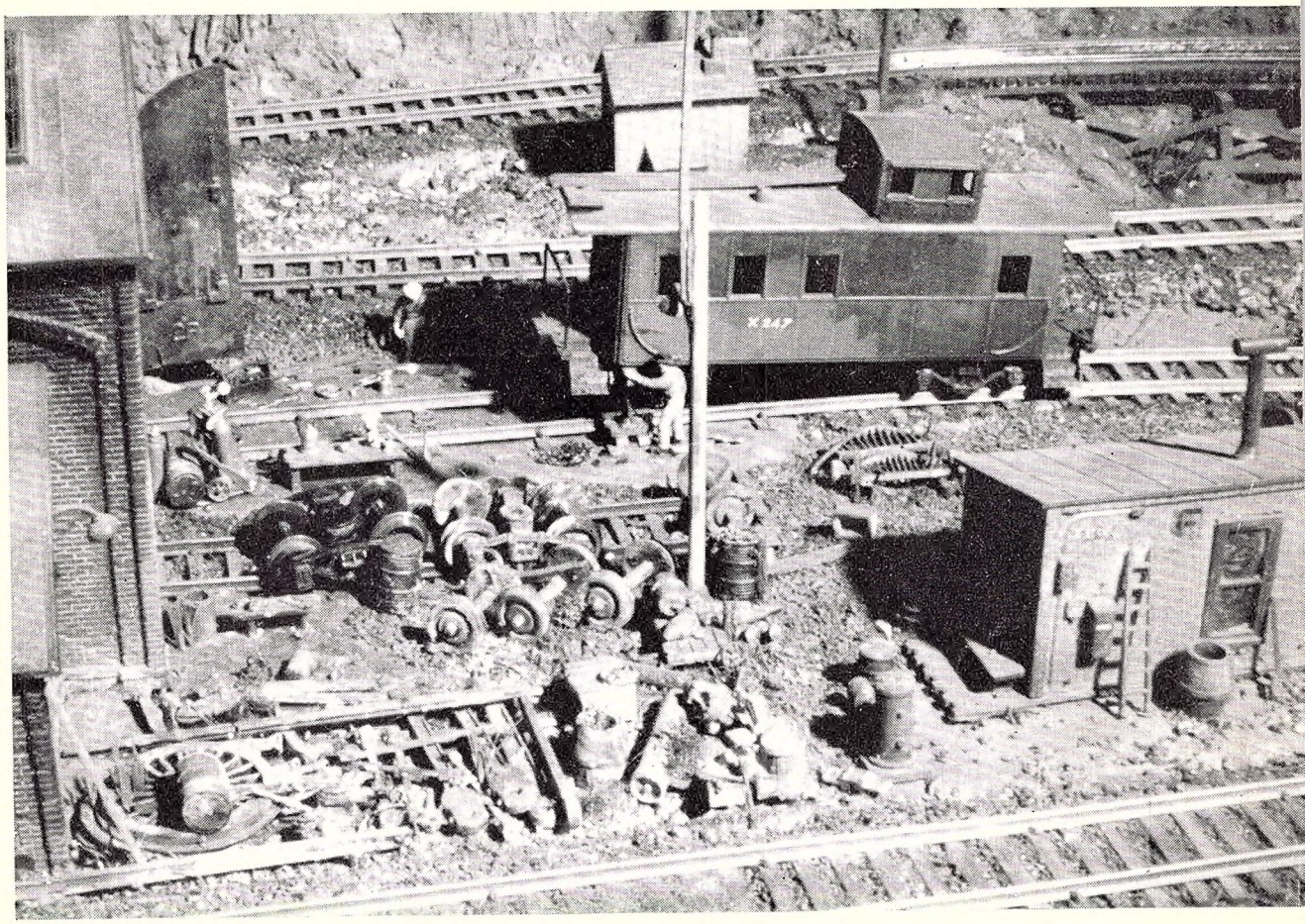
THE AUSTRALASIAN MODEL RAILROAD MAGAZINE

Incorporating "THE BOOSTER"

Price 2/6

DECEMBER 1963/JANUARY 1964

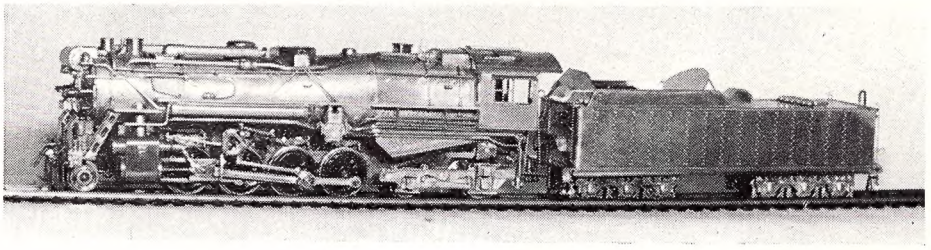
MODEL RAILROAD



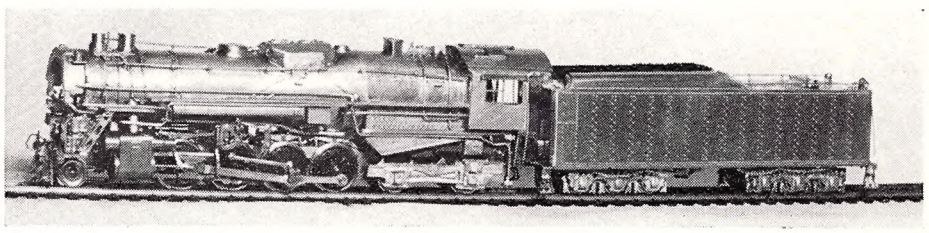
IN THIS ISSUE . . .

BUILDING A N.S.W.G.R. 18 CLASS 0-6-OT TRANSISTORISED THROTTLE CONTROL PLANS AND FEATURES

NEW BERKSHIRES FOR MAINLINE SERVICE . . .



B. AND A. 2-8-4 BY KUMATA. WITH ELESCO FEED-WATER HEATER AND FULLY SPRUNG MAIN FRAME. UNPAINTED, READY TO RUN. PRICE, £35.



B. AND M. 2-8-4 BY KUMATA. WITH COFFIN FEED-WATER HEATER AND FULLY SPRUNG MAIN FRAME. UNPAINTED, READY TO RUN. PRICE, £35.

Other News from "THE DOCKYARD" . . .

Before "reading the lesson" this trip, let us commence with an apology: The premature announcement in regard the new Kumata models illustrated last issue was prepared in Tokyo when production was certainly well in hand, but since when delays have occured which will mean that these models will not appear until, possibly, early 1964 . . . Having "gonged" ourselves, let us to more cheerful news: Those in HO who have admired the excellent "O" gauge productions by K.T.M., of Japan, will doubtless welcome the gen that 'Dockyard and its agents, as well as continuing to offer all existing lines, will in future offer the HO products manufactured under this label . . . The first model to be prepared for shipment to Australia was inspected at the plant by our Manager, his Locomotive being the Union Pacific 4-8-4 with massive "Big Boy" style Tender. Special features include removable smoke deflectors, pre-blackened frames, pilot and pilot deck, sprung drivers and a meticulous standard of detail and finish. These Locomotives should be ready for dispatch from Japan with the delayed Kumata models and at only £48 ready for the paint shop, stocks are expected to remain in the hands of our agents but briefly . . .

. . . Some years ago Kumata manufactured an excellent model of the Great Northern Z-1 Class Box Cab Electric Locomotive and since stocks finally disappeared, we have had constant call for a suitable replacement. Now, at last, a new heavy duty electric locomotive should soon be forthcoming from the plant. The big Milwaukee Road box cab Motors are the prototype and these will be available at £27, exhibiting the same standard of workmanship previously evident in the Z-1 model . . . For those needing wayside structures, embossed building card, scenic materials, etc., 'Dockyard have long maintained the largest Faller stocks in the country and with a new shipment just to hand, it is timely to mention that the Faller Catalogue is available, together with price list, at but 3/9d . . . New rolling stock kits to hand include several good items from Silver Streak! The 50 ft. Mechanical Reefer, with RP25 wheels; Burlington and Fruit Growers Express, at 40/- each. The Caboose 24 ft. unlettered or 30 ft. Union Pacific, at the same price . . . Roundhouse have also made a delivery with more of the Ore Car kits: Milwaukee Road and Great Northern being available with rectangular sides, C. & G.W. and Great Northern heralds with tapered sides, at 13/6d. each.

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,, 760	Roadside Restaurant	49/9
,, 775	Telephone Poles (1 dozen)	7/9
,, 801	Illuminated Telephone Lamps 3 for	19/11
,, 802	Illum. gas Lamps, 3 for	17/11
,, 803	Illum. Boulevard Lamps, 3 for	7/11
,, 804	Illum. Station Lamps, 3 for	17/11
,, 805	Illum. Goose Neck Lamps, 3 for	19/11
,, 806	Illum. Highway Lamps, 3 for	19/11
,, 807	Ill. Fluorescent Lamps, 3 for	19/11

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Santa Fe. 2-8-2 Mikado	33	15	0
Georgia Pacific 2-8-2 logging loco.	33	15	0
N.Y.C. 4-4-0 Painted ready to run	14	10	0
Swiss National Railways Electric Loco. Painted R. to R.	32	15	0

DEALERS ONLY! A.M.T. Customising Car Kits in 1/24 scale are now being imported and wholesaled by this firm. These kits are regarded as the finest of their type in the U.S.A. Enquiries will be welcomed.

ARTEX Plaster as used in John Wheeler's articles on how to make scenery. Available in 5 and 10lb bags price 1/4 per lb.

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,, ,, motorised tender permitting reasonable adhesive weight, for example "Lord of the Isles".

Always wanted for cannibalising: obsolete equipment such as 3R Dublo, Trix Twin.

Repairs may also be left at residence: Ralph Thomas, 61 Hewitt Ave., Wahroonga, N.S.W. Phone 48-4268.

THE AUSTRALASIAN MODEL RAILROAD MAGAZINE

Vol. 1, No. 5, DEC. 1963/JAN. 1964

Incorporating **THE BOOSTER**

THE OFFICIAL JOURNAL OF THE SOUTHERN CROSS REGION OF N.M.R.A.

AUSTRALIA'S LEADING MODEL RAILROAD MAGAZINE

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SUBSCRIPTION BY MAIL: 15/- Australia & N.Z., U.S.A. $2, U.K. & Europe 15/- stg., per annum. Make Cheques etc. payable to S.C.R. Publications, Earlwood, N.S.W.

CONTRIBUTIONS: Articles, drawings, and photographs are welcome. Accepted material is subject to whatever changes are necessary by the Editor to meet the requirements of this publication. The contents of this magazine must not be reprinted without written permission of the publishers.

PRODUCED for S.C.R. Publications by PHOTO DIGEST PTY. LTD., 483 Riley St., Surry Hills, N.S.W. 'Phone: 69-6880.

PUBLISHED by S.C.R. PUBLICATIONS, 189 Homer St., Earlwood, Sydney, N.S.W.

EDITOR: J. T. St. LEGER MOSS.

OFFICE: 55-6886.

EDITORIAL COMMITTEE: BASIL T. HAMMERSLEY, FRANK A. MAXWELL, JOHN M. WHEELER, KENNETH SPILSTED; **Staff Photographer:** IVAN W. IVE.

Illustrators: N. COUGHLAN, J. F. PARKER, PETER CALVITTO.

SUBSCRIPTION MANAGER: TERENCE M. CARPENTER.

PRINTED by Publicity Press Limited, 29-31 Meagher St., Chippendale, N.S.W.

MEET YOUR DEALER

PETER DUCKETT

Peter Duckett is manager of the Model Dockyard Pty. Ltd. of Swanston Street, Melbourne. Peter has been model railroading since his childhood days. His modelling preference has been "O" gauge using as a start Lionel equipment, building up to 350 feet of indoor and outdoor track. These days Peter's interest is in electric traction and he is a foundation member and President of the Australian Electric Traction Association.

Peter's company has been under the present management since 1953 and since then has progressively built up the model railroad side of their business to its present level. The Model Dockyard have, over the years, fostered the local production of railroad equipment and through their wholesale division import a wide range of equipment from all round the world. All the staff of the railway section are modellers and, as Peter says—"Without our staff's team-work, the progress made would not have been possible".

Our photo shows Mr. and Mrs. Duckett soon after their return from a recent visit to Japan.

A REMINDER

N.M.R.A. members and subscribers of this magazine are advised to check their membership cards or subscription receipts and to renew their subscriptions so as to ensure continuity of delivery of the AMRM.

On the Cover:

Mac Titcher, of Dandenong, Vic., is to be congratulated on the meticulous detail that he has incorporated in this scene from his layout. Other views of this railroad will appear in future issues.

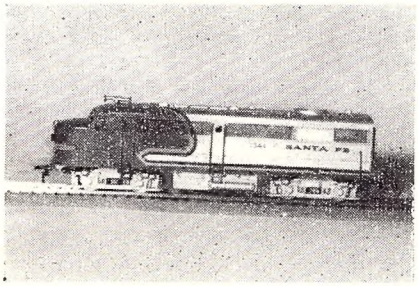
FLEISCHMANN ALCO DIESEL

Distributors:
Wilfred H. Jones & Co. (Aust.) Pty. Ltd.
374 Kent St., Sydney.
Price: £8/13/3 each.

This is a model of an Alco diesel and although the dimensions do not agree exactly with the prototype, this will not be noticeable to any other than the purist who must have everything to the exact scale.

The body is die cast alloy and the weight plus rubber tyres gives excellent pulling power even up the steepest grade. Only one bogie is motorised, however, two wheels are fitted with rubber tyres which result in maximum traction, the main disadvantage of this is that only one wheel is available for current pick up against two wheels in the rear bogie.

As with all Fleischmann locos, the wheel flanges are very deep and will not run on Code 100 track. However, they can easily be turned down if necessary.



The motor is a five pole motor of good quality, of same design as used in all their loco's. Drive is through a nylon gear train to the side of two wheels of bogie.

The paint finish on the Santa Fe is not as good as on others seen. The edges of the stripes are very blurred. Body detail is good and generally a good performer at a reasonable price.

The principal dimensions are as follows:

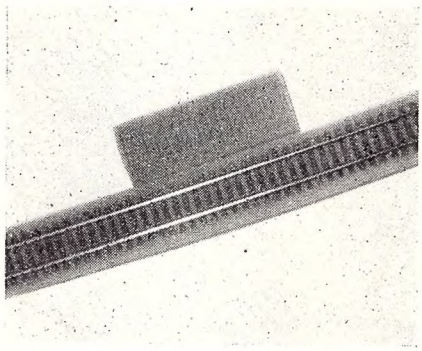
Overall length: 54'0"
Overall width: 10'8"
Overall height: 15'2"
Wheelbase: 33'6"
Bogie centres: 8'6"
Weight (motorised) 1 lb. 3¼ oz.

PECO SL-100 STREAMLINE TRACK AND FOAM UNDERLAY

Australian Distributors:
Australian Model Craft Co., Albury.
Price: Track 10/6d. per yard. Underlay 16/6d. per 5 yard roll.

Peco 16.5 mm. HO gauge flexible track is available throughout Australia from all leading hobby shops. It is ready to lay and is supplied in 3'0" lengths. The rail is made from nickel silver and with the exception of the rail head which is .002 inch under the N.M.R.A., R.P. 15.1 is recommended practice for Code 100 rail. However, this will not affect the interchangeability and no trouble was experienced jointing this rail with most other popular makes available on the Australian market.

The rail is attached to a plastic sleeper base with plastic moulded rail chairs and clips. It is fully flexible, 12 inch radius being achieved without effort. A very good feature of the track is the ease with which it straightens out after curving.



In this respect it is superior to most other flexible tracks available.

Sleepers are a brown colour with wood grain moulded in, they measure 8'3" long and 12"×6" in section, with spacing at 2'0" centres.

The track gauged a little on the tight side with an N.M.R.A. track gauge, but curving did not alter the gauge to any noticeable extent. The tightness did not affect the tracking of waggons even at speed on curves.

No provision is made to fix track, manufacturers' instruction is to fix with Peco spikes through sleeper. I prefer to cut away the chair and clip on every fifth sleeper and spike through adjacent to the rail, in this way the track will be kept flat.

The rail itself is well formed and exceptionally true in all planes. All told, a fine product which will result in good smooth operation providing a good sound base is laid.

The Peco foam styrene underlay on first appearance looked most unrealistic and did not appeal one little bit. However, after some thought I laid it in the following manner and the result — a quiet, most realistic base which looks much superior to cork or timber ballasted.

First I glued the foam strip to the base board using Pliobond — found that it curved easily and by following the printed instructions the underlay can be cut to accommodate turnouts.

Next I covered the top side, including the recess for the track, with Aquahere glue, fitted track in place then ballasted the whole area. After setting, surplus ballast swept up — result a first class realistic track with a minimum of sleeper showing.

A good product to be well recommended, although a little pricey if there is a lot of track to lay. However, as track is the most important part of good railroading, I do not think it is excessive.

AIRFIX REFRIGERATOR VAN

Distributed by:
Liberty Trading Co. Pty. Ltd.
20 Hutchinson St., Surry Hills.
Retail Price: 5/9.

This is a Series 2 Kit and is up to the usual Airfix standard of providing the hobby with good quality low priced rolling stock and accessory kits to suit the average pocket.

The Interfrigo Van is a handsome piece of rolling stock, easily assembled from the clear instruction sheet provided wheel sets are in two pieces and care should be taken in joining the two axle sections, gauge is correct if assembled correctly. Couplers of the horn type are provided and hooks are provided at rear of coupler for fitting a rubber band to keep couplers centred. If care is taken in selecting a rubber band of the right tension good automatic coupling is possible.

Length over buffers: 38'0"; Width: 9'6"; Height above rail: 12'6"; Wheelbase: 21'6".

Wheels do not meet N.M.R.A. standards and without adjustment would only be suitable for Hi rail operation.

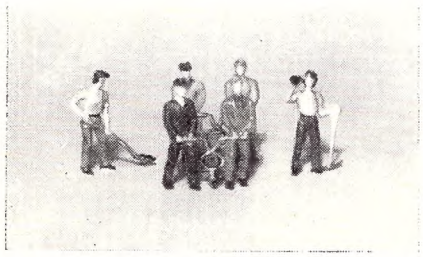
MERTEN FIGURES

Distributors:
Wilkinson Beale & Tindley Pty. Ltd.,
204 Clarence St., Sydney.
Suggested retail price: 8/6d. per set of six.

Illustrated are but a few of a very wide range of figures available in this manufacturer's range. The figures all stand approximately 5'10" to 5'11" high and are in many poses including sitting and action.

Each set consists of six figures either singly, or in groups. The figures are plastic and are painted. It is quite easy to cut the links and alter the pose or add, or subtract detail to change the character of the figure.

A range of TT figures are now being made by this company, but at the time of writing stocks are not available in this country.



Generally the figures are well made and the finish is good. Most will stand up without glue if desired. Naturally, many of the groups are European in character, however, there is a wide selection which could be used on any prototype railway.

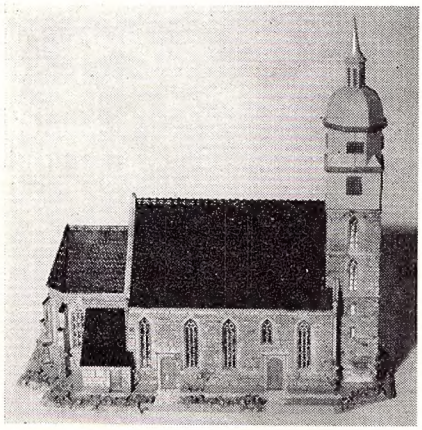
Suggest you ask your favourite hobby shop to show you the range, they certainly add realism to any layout.

KIBRI CHURCH

Distributors:
Wilkinson Beale & Tinley,
101 Clarence Street, Sydney.
Suggested list price: 34/6d. each.

This is another item in the large beautifully produced line of Kibri track side and town buildings.

The building reviewed was fully built, however, it is available as a kit. The building was painted and stonework weathered. The kit is not painted at all.

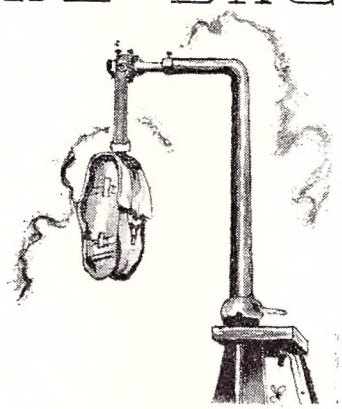


The windows are simulated stained and lead lighted coloured glass and really look fine when lit internally.

Size of building is 8 inches long by 4½ inches wide by 8 inches high to top of spire.

This is a fine building which would do any township proud. Suggest it be combined with the wedding group of figures in Merten.

MAIL BAG



BE BRIEF — ABOUT 100 WORDS

Sir,

I bought the August/September issue at the Model Railway Exhibition at the Town Hall last Saturday. I found the exhibition very interesting and I thoroughly enjoyed the many layouts and models exhibited and am already looking forward to next year's exhibition. The magazine is excellent for all model railroaders and I anxiously await each new issue. The articles, especially John Wheeler's building plans and Shop Window and the Shop Detective are very good.

TERRY SPARLING,
Lane Cove, N.S.W.

Sir,

During a visit to the recent exhibition at the Sydney Town Hall, I was pleasantly surprised to learn there has been some agreement regarding "Standards", though there is still a lot to be desired, and that at least one Australian locomotive is available.

Pardon my ignorance but I did not know of the existence of your magazine until the Exhibition at the Town Hall when I purchased a copy and found it very informative, though I would like to see Australian place names on track layouts instead of the American which seem to be prevalent at present, but not necessarily names like Wagga Wagga etc.

W. O'HALLORAN,
Blacktown.

Sir,

When we moved eight months ago I notified the SCR Secretary of my change of address — no notice has been taken of this, and the one meeting I happened to be in Sydney for, I was unable to attend because I received the notice after I had returned home.

Secondly, the Yearbook listed my membership wrongly, stating that I exchanged passes, which has caused me a lot of trouble writing to fellows in the States trying to explain that I don't. I altered my wrong HO+6B to the correct HO+6Ub on my last membership renewal last November, but to no avail.

How do I go about impressing someone that my address is wrong and my pike data also — would you be so good enough to pass this letter on to someone in an effort to achieve this.

CHRIS PRATTEN,
"Koolewong", Borenore, NSW.

Sir,

I have recently made inquiries concerning Australian manufacture of nickel silver flat base rail for "O" gauge. The size and price is estimated to be the same as for the brass rail now available, however it is needed to know if sufficient "O" gaugers are interested before production can start. Also, if a few modellers will group together, they will most likely be able to purchase direct at a reduced rate.

Would those interested please contact me at the address below?

J. N. MACMICKING,
14 Stan Street,
Willoughby, N.S.W.

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Editorial . . .

As a boy I remember being very fond of jig saw puzzles and as the time draws near for each issue of the magazine to be prepared for the printer I recall the frantic search for the right piece to fit in a certain spot in the picture. When an issue is planned it is fairly easy to search among the contributions and select several articles of varying interest as the main attractions. Take this issue for instance. A construction article, an electrical article and a layout article. But we always feel that there will be some readers to whom these articles have no appeal. Should we have included one on scenery, or signalling, or painting and lining vehicles?

There isn't enough room to have every thing each issue. And we have more of certain types of articles in store than others. Prototype stories, for instance, we have plenty of at the moment. This being primarily a modelling magazine we feel that too much prototype would not be popular. On the other hand we would like to have some more articles on modelling rolling stock, constructing scenery and lineside structures and superdetailing or rebuilding of kits. Also this magazine is crying out for an author who can give readers good advice about track laying and point construction.

With the circulation at the 4000 mark there must be many readers who have spots in their layouts which could be featured in The Scenic Route, or even on the front cover. Norm Coughlan, who draws up the plan for each issue, is anxious to obtain as many plans as possible from all the States and New Zealand so that he can present as varied as possible features on the inside back cover. Any readers who have access to plans, preferably with an accompanying photograph in each case, and can lend or give them to Norm will be extremely popular. At the same time we are anxious to obtain readers' views on the plans that they would like to see in our pages.

As regards to contributions in general we will gladly accept them on all subjects. But don't be disappointed if you don't see them in print immediately. We are holding them until the right spot appears in the jigsaw.

A prosperous New Year to you.

BEXLEY NORTH HOBBY CENTRE

14 SARSFIELD CIRCUIT

- WILLS FINECAST IN LATE DEC.
- SENTINEL POINTS — SHINOHARA POINTS & TRACK
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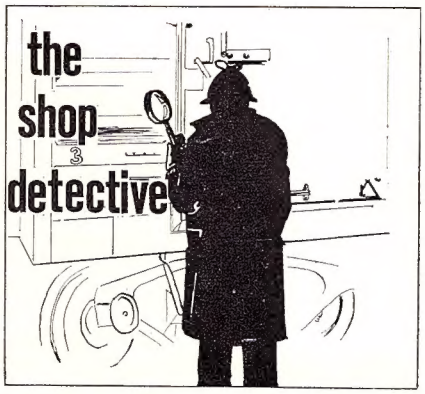

Have had many enquiries from modellers as to where dimensioned stripwood can be procured . . . . Hobbyco and Sydney Model Railroad Supplies in Sydney have all Austral Modelcraft materials, SMRS also carries Suydam & Co. dimension stripwood and boxes of scale lumber at 13/6d. per box as well as angles, channels and tees at 2/10d. per 22 inch length. Hobbyco also carry Obechi pine stripwood in various sizes. Mac. Titcher in Victoria and Len Opie in Adelaide carry North-Eastern scale lumber. Model Dockyard in Melbourne and Piccadilly Hobby Centre in Brisbane carry Austral Modelcraft sheet timber . . . . Stocks of Atlas lineside buildings, including water tower are available in most Sydney hobby shops.

Will shortly be reviewing the station kit — these kits are worthy of your attention, prices most reasonable . . . . Sydney Model Railroad Supplies have new Japanese loco's on the way, the Georgia 4-6-2 Pacific Logging Loco and also the Canadian Pacific 4-6-2 . . . . same company have the Ambroid passenger car— three in one kits — £8/17/6 per pack of three cars.

From Melbourne town we have word from Mac. Titcher that he is also carrying Styrene sheet 6½ inches by 10 inches, varying in thickness from 0.010 to 0.40 inch, priced 1/6d. to 5/6d. per sheet. Rods ¼ inch. dia. by 12 inches long, 1/7d. each, also clear sheet 6½ inches by 10 inches by 0.15 inch thick, 3/- per sheet . . . . Model G-2915 styrene hollow ground cutting knife, 7/6d. each . . . Al. Armitage, trackside building plans 2/6d. per sheet . . . . Recordings of steam loco's in action — both mono or stereo available under many headings at approximately 57/6d. each, obtainable from Hobbyco, or Titchers . . . . More samples from Hornby — A well detailed cantilever signal bridge with adjustable working two light heads from the French Aicho range — they are an all metal unit in lattice girder construction . . . . Have you examined the Crown line of American prototype freight cars? They are good value — Gondola and flat cars 15/6d. each, box, tank and caboose 18/6d. each, complete with sprung trucks and X2F type couplers, all are ready to run . . . .

(Continued on Page 23)

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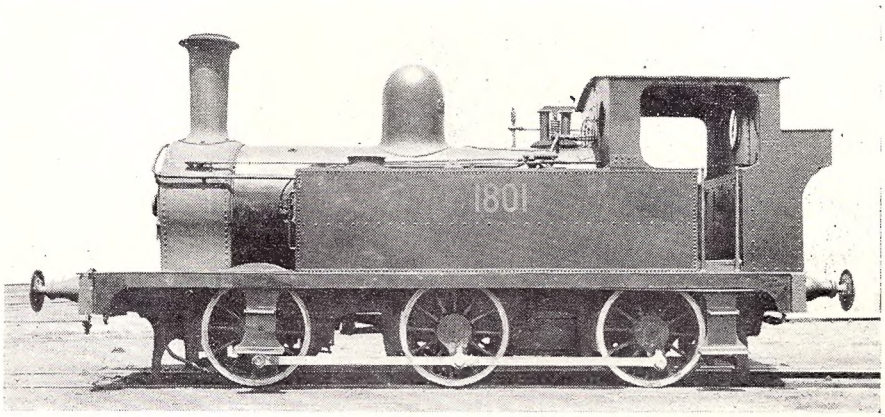
Building an HO 18 Class 0-6-0 Tank Loco

By

Jack Grierson



In 1882 six 2-4-O type tank engines were ordered from the Vulcan Foundry in England. In 1884 they were delivered as domeless 0-6-0 types. They were too sluggish for suburban working and as soon as possible were put to work as coach shunting engines. They were rebuilt with domed boilers from 1907 and in 1927 transferred to locomotive yards. As the diesels take over they await the scrap metal merchant's torch. Readers will be interested to learn that one has been put aside to fill a place in the Rail Transport Museum.

NOW let us describe the modelling of this locomotive in HO scale, 16½ mm gauge. Firstly obtain photos of the left and right hand sides; also front and rear if possible. Photos of each side may be obtained from the Public Relations Dept. of the N.S.W.G.R. for a small fee.

Chassis and side rods. From a piece of 1/16" thick brass cut two pieces 12 mm wide and 91 mm long. Mark out one piece as in Fig. 1 and carefully centre punch the axle centres and the holes each end. Next cut two pieces of 1/32" brass or nickel silver sheet to 80 mm long and 12 mm wide for the side rods. Clean up the four pieces except the marked out side and one side of the 1/32" sheet and tin without leaving any lumps of solder. Smear all tinned surfaces with flux and place the marked out piece down on a flat surface. A piece of 5-ply wood is ideal. Place the other chassis side on top with the top edges in line. Next the 80 mm pieces, matched together, are laid on top of the chassis pieces equidistant from each end. Sweat all together using plenty of heat from a blow lamp or a large soldering iron. While the solder is still molten press down with another piece of 5-ply taking care not to move the pieces.

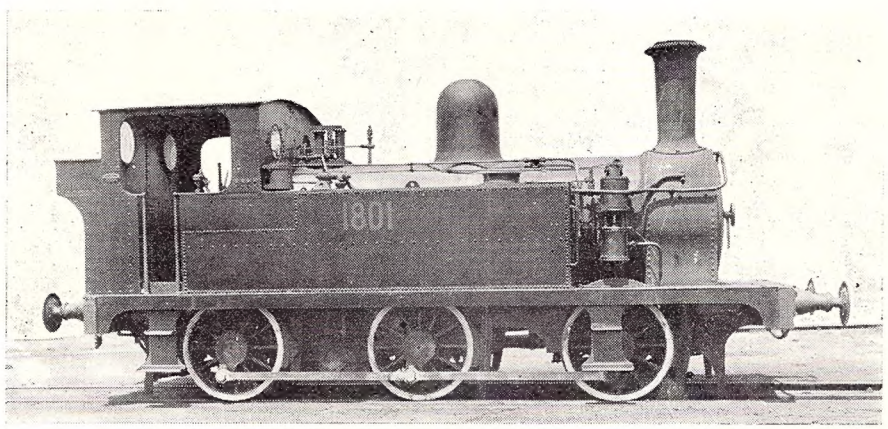
Now we should have four pieces of brass with front and back surfaces parallel and with the top edges in line. Drill all holes using a drill press or a lathe. Use a no. 55 drill first then a no. 50, cleaning off any burr from the back after drilling. Through the hole in each end clamp the side frame members together with 10 BA bolts and nuts. Mark the front and top of the side rods and unsweat from the chassis sides. Line up the holes in the rods and resweat together. Drill the axle holes in the chassis sides to ⅛" diameter.

Cut and file the chassis sides and side rods to shape after marking the front and top of the latter so that they can be identified later. Unsweat chassis sides and remove any excess solder. Mark out the left chassis side for the collector screws and drill the two holes 3/32".

Place the top edges on a piece of plate glass, mirror or other perfectly flat surface with spacers of ⅜"×⅜"×⅛" brass at each end between the sides. Square up all ways and place weights on either side to prevent any movement and then solder the end spacers to the frames. After the work has cooled check for rocking movement between the chassis and the glass; also check for squareness of the frame. If it checks true pass an axle through each hole. They should turn freely; if not pass the ⅛" drill through with the fingers, twisting gently to remove any solder that may have run in.

Place the gear between the frames and pass an axle through it via the No. 1. holes in the frames.

Supporting the motor. Cut two pieces of brass — one ⅜"×5/16"×1/16" and the other ⅜"×⅛"×1/16" thick for the motor supports. Mark the 5/16" piece 3/16" from one side and 3/16" from one end and where the marks cross drill 7/64". Remove one nut from the motor and place the plate over the screw and tighten the nut back on. Place the worm gear on the shaft and push the motor and plate between the chassis sides, engaging the worm and gear centrally. The top surface of the back support should be 3/16" from the top of the chassis. Tack solder the plate to the chassis. Place the 1/8" plate under the front of the motor and tack solder in position after making sure the worm and gear are fully engaged. Use a hot iron and do a quick job to



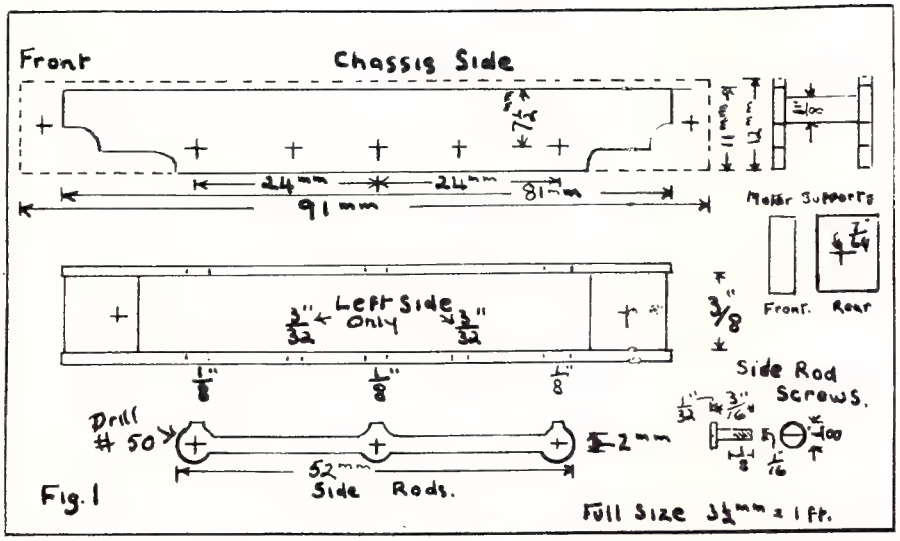


Fig. 1

prevent too much heat reaching the motor. Remove the motor, axle and gear and solder the motor supports properly, taking care not to move them. When reinstalling the motor later a piece of shim brass or notepaper is placed between the front support and motor in order to lift the worm out of the gear a fraction; otherwise irregular running and harsh noises will result.

Sandboxes, wheel guards and collectors. The next step is to solder the four sandboxes and four wheel guards in position. A piece of knitting needle, not the kind that melts with heat, is turned 3/32" for about ¼" to fit in the 3/32" holes for the collectors. It is then drilled no. 50 forming a tube. Place this through each collector hole in the chassis and cut off flush with the chassis sides. Place a strip of phosphor bronze, with a no. 50 hole drilled one end, on a 10BA cheesehead screw, followed by an insulating washer and pass the screw through the insulating tube in the chassis. Add another insulating washer and nut up tight after positioning the phosphor bronze strip to pick up current from the back of the wheel rim. Do this for both pickups. The final adjustment can be done when the wheels are in place. (See Fig. 2).

Wheels. Drill all wheels no. 55 and tap 10BA for crankpins in a lathe or drill press using a piece of flat brass with a hole in it large enough for the boss at the back of the wheel to fit in to keep the wheel flat. Turn a piece of brass with a shoulder as in Fig. 3. Cut off and place in chuck with the shoulder against the chuck jaws.

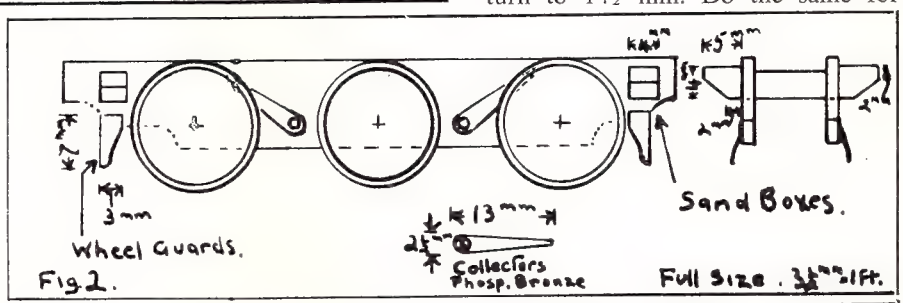
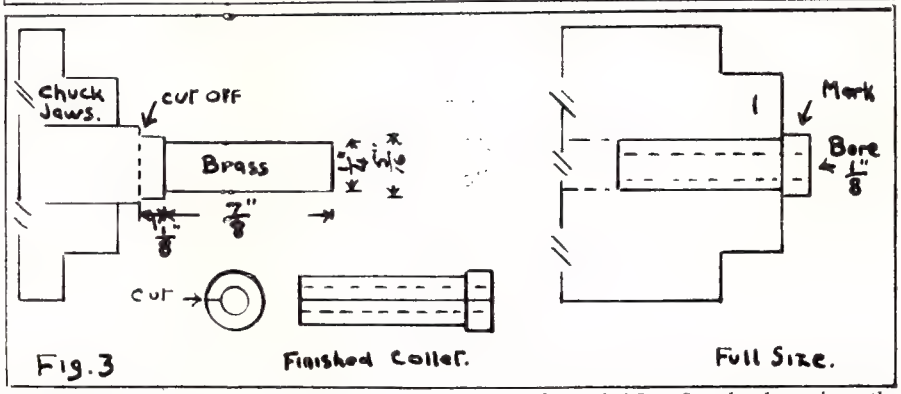


Fig. 2.



Drill 7/65" and bore the hole a tight sliding fit for the ⅛" axle.

Mark the brass at the no. 1 jaw, remove from the chuck and with a fine saw cut lengthways between nos. 1 and 2 jaws. This is used as a collet for holding the axles while the wheels are turned true.

Screw the uninsulated wheels to their axles and mark the axle on the crankpin side to enable the wheel to be put back in the same position. Don't mark in such a way as to interfere with the bearing surface of the axle. Place the collet in the 3 jaw chuck with the shoulder against the jaws and the mark against no. 1 jaw; push the axle in the collet; tighten the chuck. The axle should be held firmly without any trace of slip. With a cutting tool ground to the wheel contour turn the tread to 14½ mm. The correct size for the wheels is 14 mm and as they are not available the only thing to do is to turn down 15 mm wheels. However, if these were turned down to 14 mm the tread on the insulated wheels would be just about cut away. So turn nos. 1 and 3 wheels down to 14½ mm using the micrometer setting on the lathe to ensure both wheels being the same. No. 2 wheel is turned to 14¼ mm.

Place each wheel with axle in separate boxes numbered 1, 2 and 3. Place an insulated wheel on the no. 1 axle, quartered properly, remove the uninsulated wheel, push the axle into the collet chuck and turn to 14½ mm. Do the same for no. 3 and No. 2 wheels using the same micrometer settings on 1 and 3 axles and 14¼ mm for no. 2 wheel. Don't mix up the wheels after being turned and keep the axle ends and the wheels they were turned on together.

By making the centre set of wheels slightly smaller in diameter the possibility of 'seesawing" and derailments are reduced.

With the lathe make six screws for the crankpins as in Fig. 1 from steel; a 4" nail is alright for this. Make one at a time and put the thread on with a 10BA die before cutting off from the nail stock. After that put a fine saw cut across the head of the screw. The thread should not go right up to the head but stop short a little more

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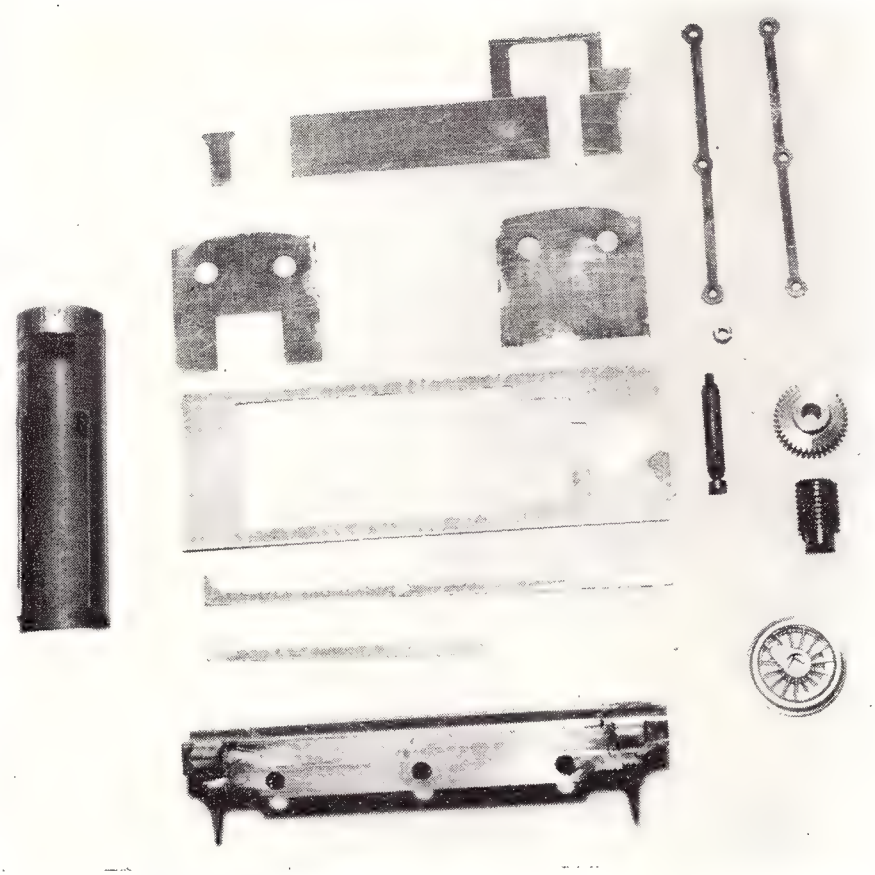


than the thickness of the siderod so that binding does not occur when the screw is tightened into the wheel. Separate the siderods. If made of brass tin them all over wiping off any excess with a piece of cloth before the solder sets. This will give them a silver look. Clean out any solder that may have flowed into the crankpin holes.

Paint the chassis and wheels black but not where the motor fixing nut will rest. Fit the wheels and axles into the chassis with the insulated wheels on the left hand side, the gear on no. 1 axle and the uninsulated wheels quartered properly using the mark we made on the axle on the crankpin side.

Insulating washers are placed on axles 1 and 3 between each wheel and the chassis. This prevents the wheels moving too far sideways and fouling the steps when the locomotive is travelling around curves. At this point it is suggested that if this locomotive is to be run on layouts with small radius curves it may be advisable to remove the flanges from the middle set of wheels whilst the wheels are being trued up.

Run the chassis and wheels along a piece of track. It should run freely and the centre wheels should not turn because they don't touch the rails. However, see that the centre wheels turn freely also. Lack of free turning is due to paint in the axle holes or else the chassis is not square. Screw the siderods on with the front to no. 1 wheels and the top of the rods uppermost. Again place it on the track. It should run freely once more without any binding. If it does not then very slightly enlarge holes 2 and 3 horizontally on each side with a round needle file. Put together and try once again on the track. If still binding undo one screw at a time until the wheels turn freely. Enlarge the offending hole when found. It is much better to have two or three tries at enlarging a hole rather than taking out too much the first time and ending up with a sloppy fit on the crankpin.

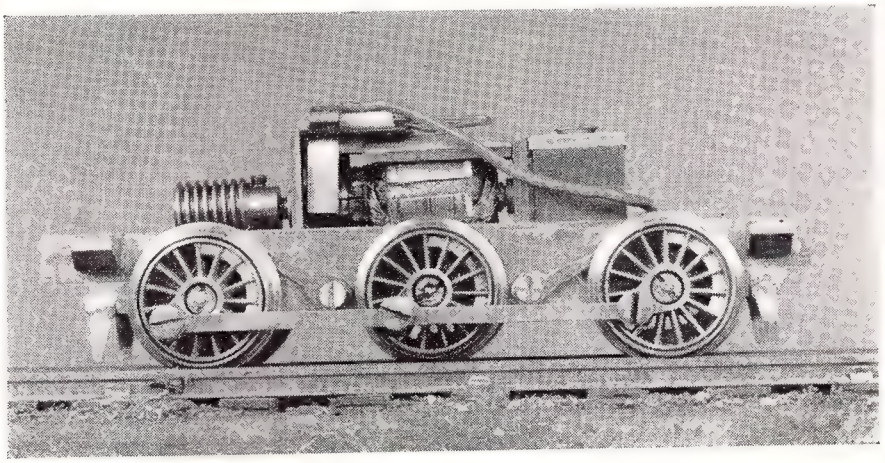
When the chassis runs freely adjust the phosphor bronze pickups to the backs of 1 and 3 rims. A very slight resistance to free running is to be expected from the pressure of the pickups on the rims.

(Continued Next Issue)

LIST OF MATERIALS

1 Romford Terrier Motor
1 set of 40:1 gears
3 insulated Romford 15 mm wheels with flanges
3 uninsulated Romford 15 mm wheels with flanges
3 Romford axles and nuts
1 ft of ½" x 1/16" brass
1" of ⅜" x ⅛" brass
1" of 5/32" square brass
3 square inches of 1/32" brass or nickel silver
1 square foot of 1/64" brass
1 packet of shim brass of assorted thicknesses
A small piece of phosphor bronze spring strip
3" of 11/16" brass round rod
1 ft of ⅜" brass rod
1 four-inch nail
4 countersunk 10BA bolts
2 cheesehead 10BA bolts with nuts
1 packet of Sentinel nickel silver wire
Insulated flexible wire; insulated washers; heat resisting, non-metallic knitting needle; small spring as found in X2F coupler kits etc.; lead for weights; solder; etc.

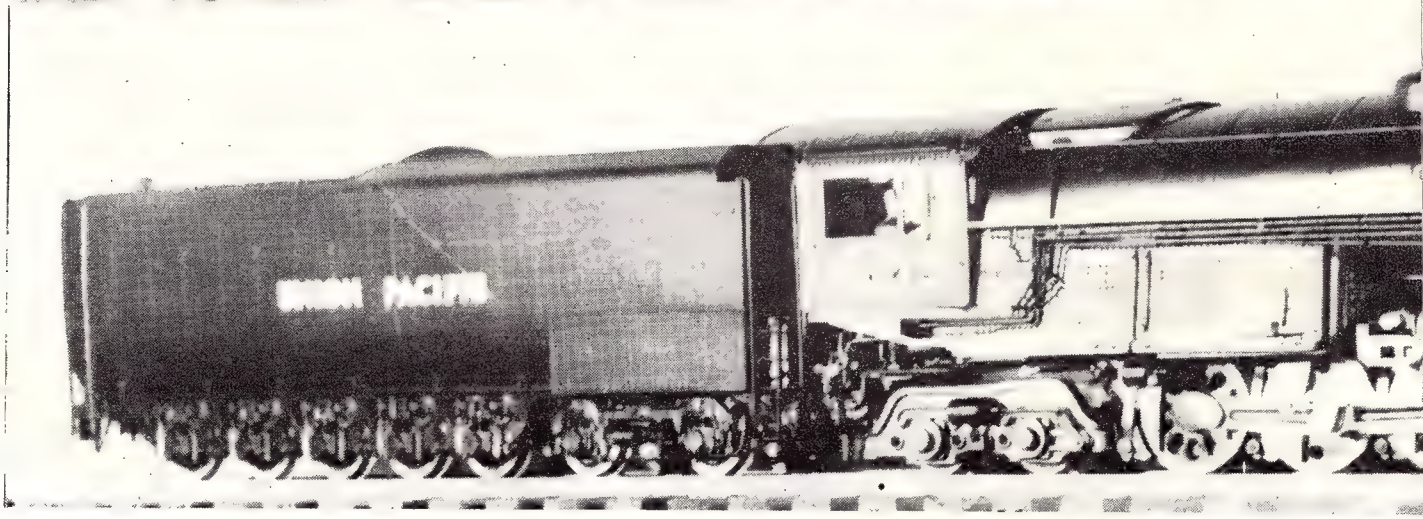
Small tools needed: Various needle files; piercing saw; medium and coarse tooth saw blades; 10BA tap and die; Number drills—72, 55, 50; Inch drills—5/32", 7/64", ⅛".

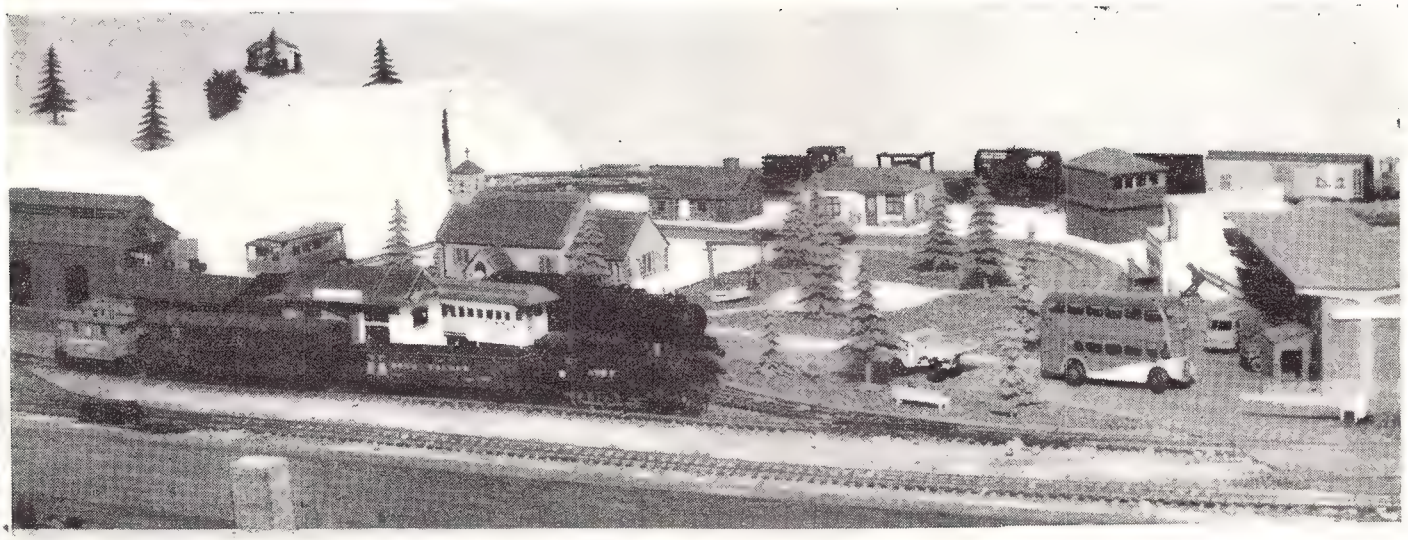


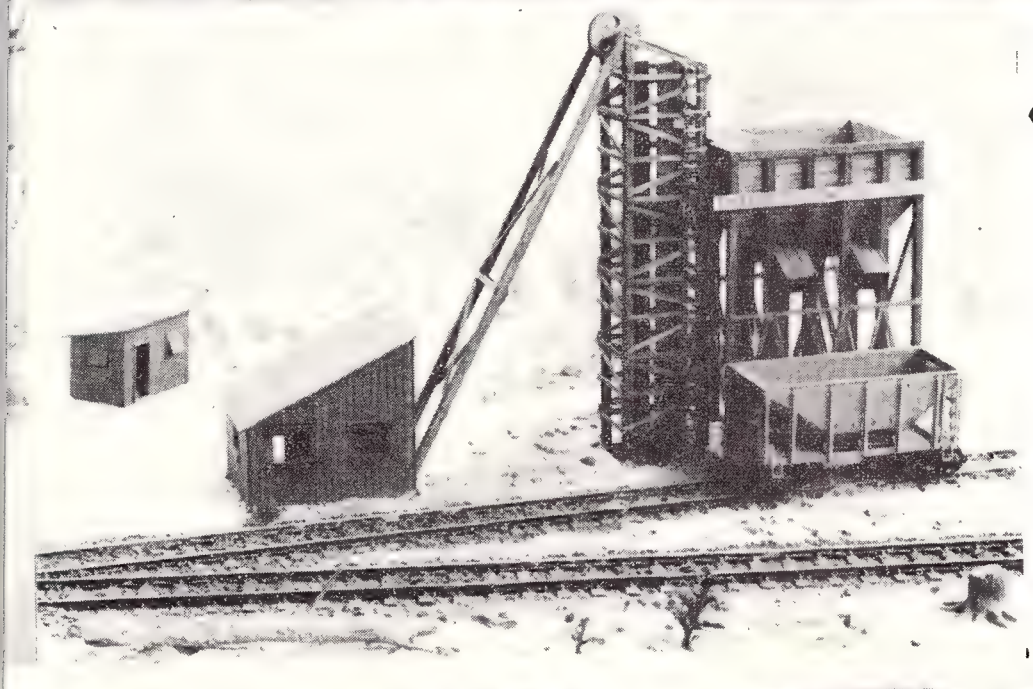
the scenic route

A well detailed scene on Grizzley Flat & Spring R Railway built by Stephen rell, age 14, of Arncliffe, N

This scene shows a NSWGR 18 class loco pulling a VR gondola code QR and a K's SR prototype similar to NSW type. The bridge is modelled on the VR Ferntree Gully Trestle. Modeller Ellis Eyre of Hurstville, NSW.

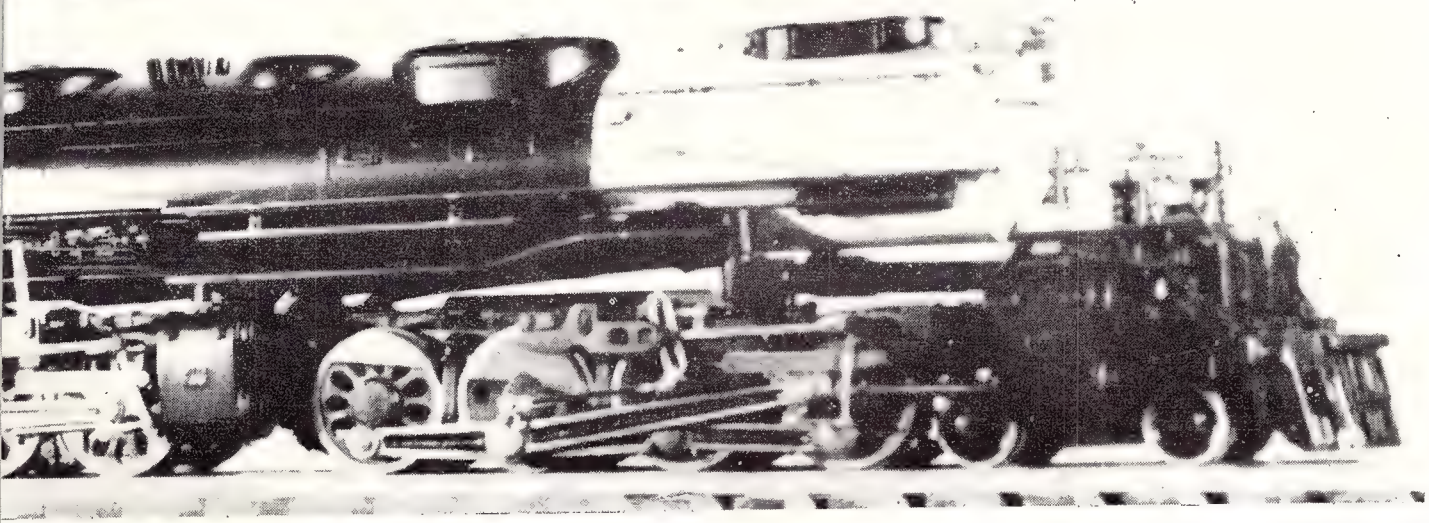






The newly constructed mine structure on the Taylor Creek Mining Company Railroad. Photo sent in by Chairman of Directors Michael Andrews of 138 Slater St., Christchurch, N.Z.

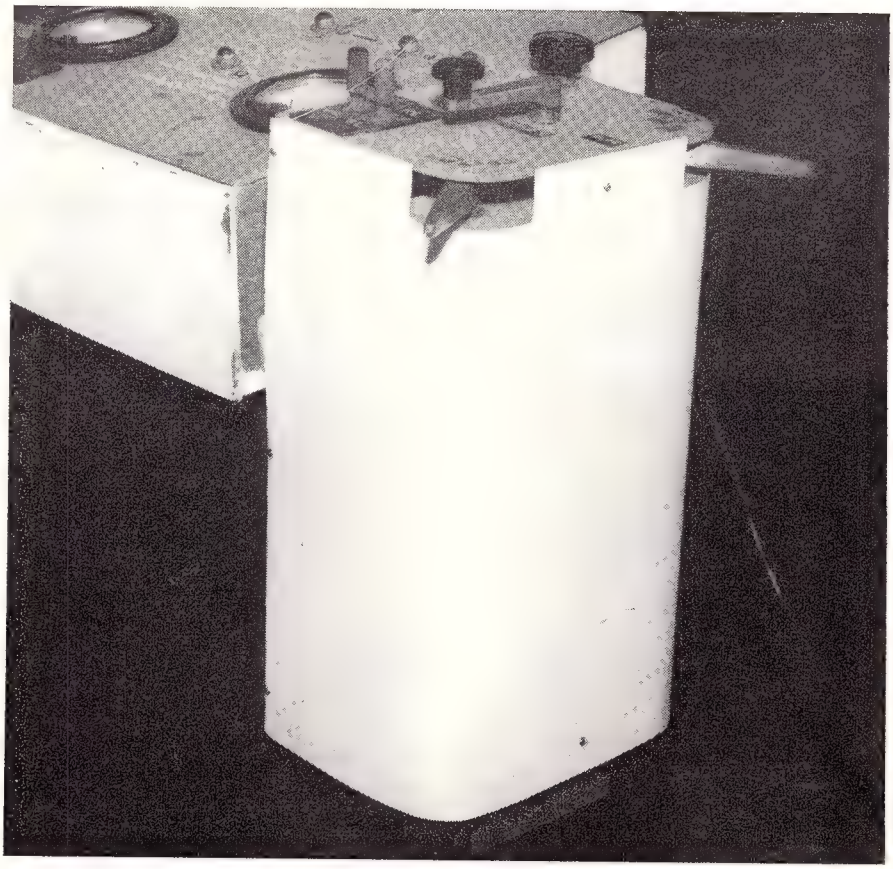
This massive O gauge Union Pacific 4-8-8-4 "Big Boy", scratch built by Kevin Pippen, was one of the contest winners at the recent model Exhibition in the Sydney Town Hall.



TRANSISTORISED THROTTLE CONTROL

By

AMRM Staff Writer



THIS article is not intended to be a technical discussion on transistors or throttle circuits. There have been many articles in Overseas railroad magazines and in N.M.R.A. Bulletins on this subject and these are listed in the bibliography at the end of this article.

The writer is not a radio technician nor have I much knowledge of such matters, and therefore I will confine the article to a discussion of the advantages I have gained from the use of such throttles, two methods I have used to house the throttle, a detailed instruction on how to build a throttle using a circuit which has been used overseas modified with parts readily available in Australia.

The throttle circuit I have used is one described in the Railway Modeller last year. I selected this circuit as against one of the American circuits because the author set out a simple construction method for the beginner to follow in building up the circuit. I recommend that you try to procure or borrow the three issues before commencing construction. The magazine is distributed in Australia, by Messrs. Australian Model Craft of Albury, N.S.W. I have been operating the throttle for nearly six months and in that time I have had some of the most enjoyable moments of my modelling career in operating my layout with smooth starts, slow speed operation and gentle stopping. I have a second throttle operating on voltage control but I rarely use this these days, in fact I shortly plan to convert this to a transistor throttle using one of the American circuits just to compare the operation.

At the outset let me make one point clear. If you are content with a throttle with forward and reverse and a normal rotating speed controller then don't read any further, you would be just as well off buying an H & M controller which are just as good as any transistor controller for straight train control.

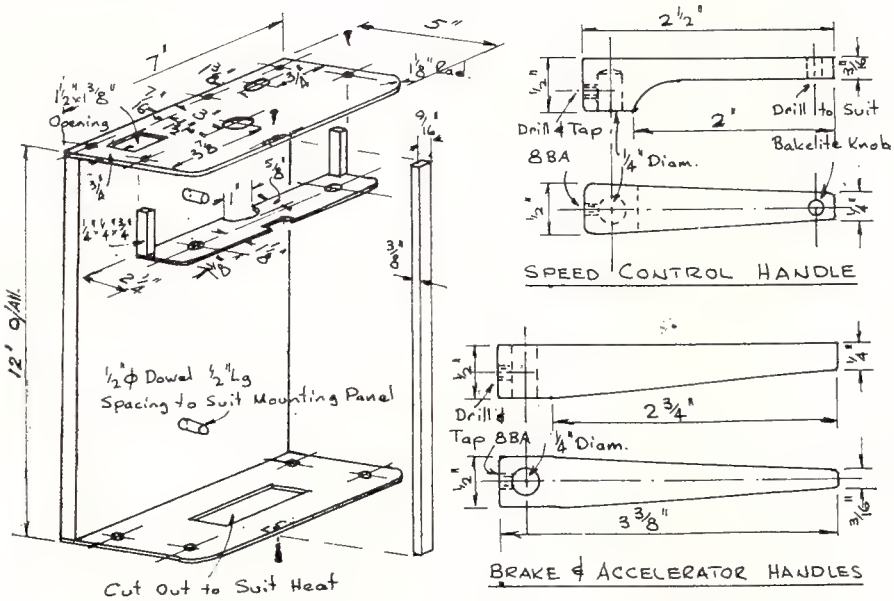
The transistor controller has the advantage that with the addition of side circuits you can cheaply introduce such improvements as controlled acceleration, drifting with the throttle closed, and controlled gradual braking, all of which add tremendously to the enjoyment of operation. In addition I have found that most locos and especially the Japanese Diesels have greatly improved performances with this type of control.

I have found that all makes and types of locomotive behave differently with the throttle and each has to be handled in a different fashion to obtain maximum performance. Most Japanese locos perform extremely well. I think this is because most are well geared down and therefore have a good slow speed performance.

A good investment with this type of throttle is a volt meter as this can be used as a speedometer to tell you at what speed your train is travelling. As you will appreciate because of variations in gear ratio, driver size and electric motor performance each loco will achieve a given speed at a different voltage. For example my Tenshodo 0-8-0 switcher travels at 30 m.p.h. at 10 volts. Whereas a Mantua 4-6-2 Pacific achieves this speed at 7½ volts. However, having tested each locomotive you can set the throttle to a given voltage at any time and the particular loco will operate at this speed. I have marked the throttle lever with the 30 m.p.h. mark for each loco so that I can preset the speed, adjust the delayed acceleration, release the brake and the loco will move off gradually accelerating to 30 m.p.h. then hold this speed indefinitely. As with all forms of control the locos speed up a little going down hill and slow down when climbing, however the voltage doesn't vary in the process, but the current constantly adjusts itself to the requirements of the motor. That is why this type of control is so good, the voltage which controls the speed remains constant for any given setting of the throttle whilst the current which controls the pulling power of the motor is constantly varying according to the needs of the electric motor driving the loco. It is therefore possible to have say 4 volts flowing with a current draw of 1½ amps, where a loco is pulling a full load, or 4 volts with ¼ amp when loco is running light.

Returning to the question of the time delay to give controlled acceleration. You will see that we have two settings of the control to give either slow or fast acceleration. It must be remembered that the voltage is starting from zero and the average voltage required to start a loco moving is 4 to 6 volts, therefore the loco will remain stationary for a number of seconds before it commences to move. I have found that with practice it is possible to set the accelerator to fast start and just before the loco moves off swing to slow delay, in this way the delay before starting is minimised.

The illustration at the beginning of the article shows the completed controller with the front cover in place. The two switches on the left are the forward and reverse switches controlling the normal and reverse loops trackage. In the centre of the top panel is the main throttle with the shunting control in the back left hand corner. The two levers on the side are front-brake and rear-accelerator. Plan 1 sets out the construction which is self explanatory and Illustration 2



1. Construction details.

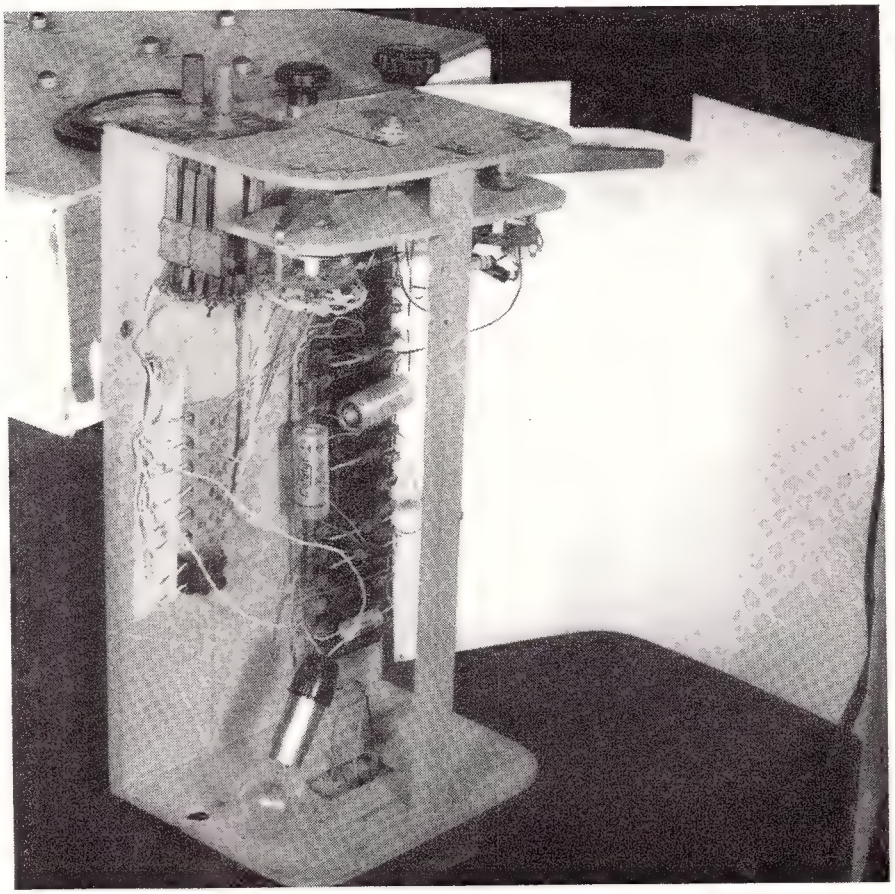
shows the completed controller with the front aluminium cover removed. Note the OC 28 power transistor and its aluminium heat sink in the base. The component mounting panel on rear and the lamp is a current limiter, which I have found to be more satisfactory than using a magnetic cut out as recommended. I couldn't keep the jolly thing from triggering off with the heavy current requirement of some Japanese locos. The sub-platform below the top platform is for mounting the brake and accelerator switches. The controller can be made any size you may wish, the one illustrated was a good size for my requirements and will suit most railroaders.

Illustration 3 shows a front and rear view of a more recent development which I have just completed. This is a small walk round controller incorporating the control section of the transistor throttle. With my particular type of layout I found that the fixed position controller was alright for group operation but when I am on my own it is only suitable for continuous running as all my turnout controls are either in small control panels round the layout or are manual switch throws at the turnout. In the short time I have had the walk round controller working I find that it is not satisfactory having the block control switches back on the main control panel as I now have the reverse problem of having to move back to the main board to select the block required. The next move is to build small cabs at various points round the layout.

To keep the controller as small as possible and to minimise the number of cables to the box I have used PMG type relays mounted in the main controller to operate the direction controls plus an on/off switch to cut all power, by doing this I have been able to use small single pole switches instead of large and expensive double pole double throw type. You will notice that this controller has only one lever to control brake and accelerator instead of two in the previous controller. This has been done to conserve space and the hook up for this is included in the throttle circuit diagram. So far I have not given this new set up much use but my initial impression is that the two switch control of braking and acceleration is to be preferred to the single switch. However, I would like to test the operation further before making a definite comparison as I feel that the lack of experience with a single switch type control may be the reason.

The control box has been made from white opaque perspex and the current limiting lamp mounted inside, so that when a short circuit occurs the whole box lights up as a warning. The box size is 5"×3½"×1⅝" deep with a 5½" diam brass tube handle one end. The switches are single pole single throw toggle switches and the brake/accelerator a 12 position single pole wafer switch, of which I have used seven positions. Small blocks of perspex will be cemented to front limit movement of switch. I have used the surplus terminals on the back as grouping points for the various re-

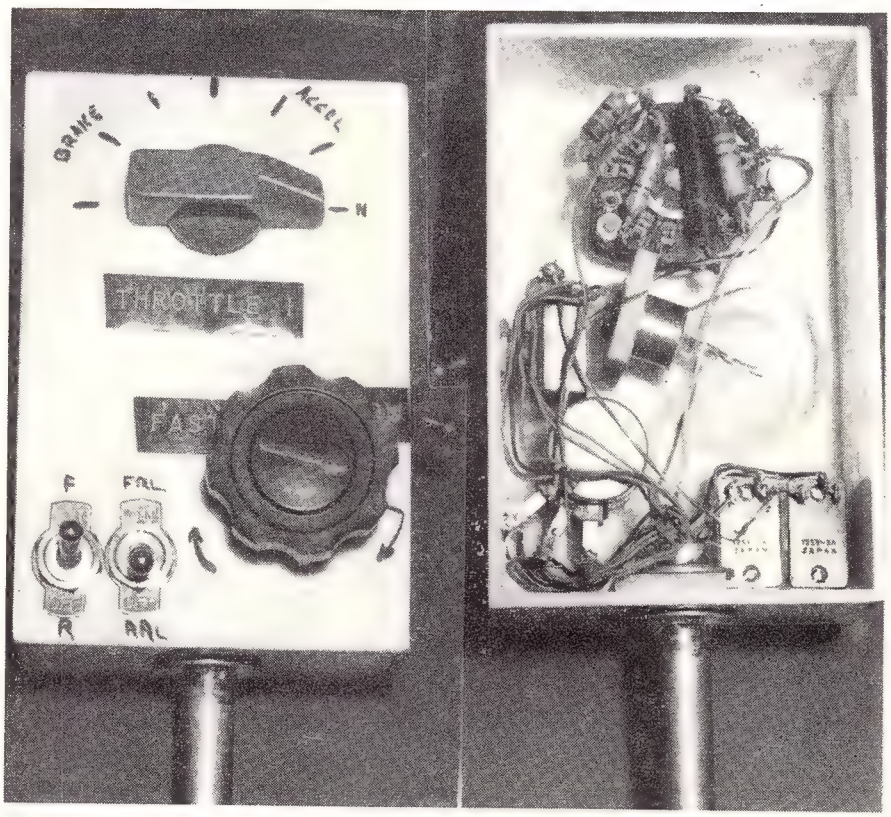
2. Controller with cover removed.



sistors and the diode. The lamp used for current limiting is a Number 1000 automobile lamp in series.

So much for the operation of the throttle and the housing of the controller. Illustration 4 shows the circuit of the transistor throttle with the parts notated against each item. Next issue I will outline a simple method of wiring the circuit which can be easily followed by even the most inexperienced modeller. In the meantime those of you who are experienced in radio techniques can push ahead and build the throttle. Just watch out that your polarities are correct otherwise you may have a few fireworks and burnt out parts. The potentiometers P1 and P2 are ganged together, in this way you will obtain automatic pulse power, with maximum AC being fed in when the DC is at a minimum. At full throttle the AC component is zero. To operate the shunting control the main throttle must be turned off and vice versa when operating the main controller, also the brake/accelerator switch must be turned to the normal position. All the items listed are available in Australia, from any radio parts store and the cost of the parts less transformer and rectifier is about £8.

For the most satisfactory performance the power pack should deliver approximately 20 volts DC. I connected a 6.3 volt filament transformer in series with



3. Front and rear views of "walk round" controller.

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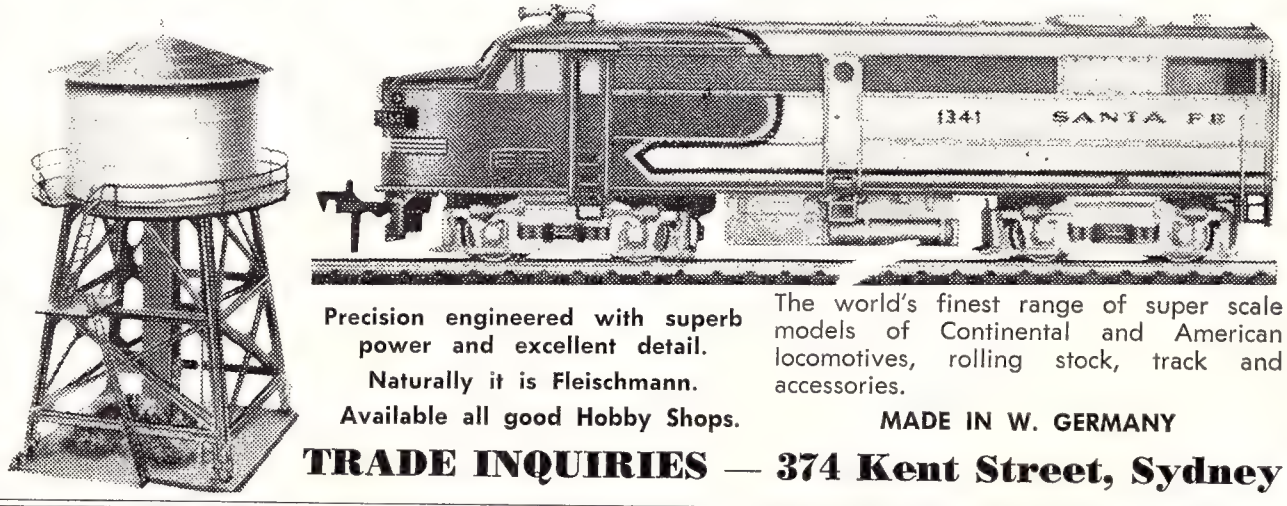

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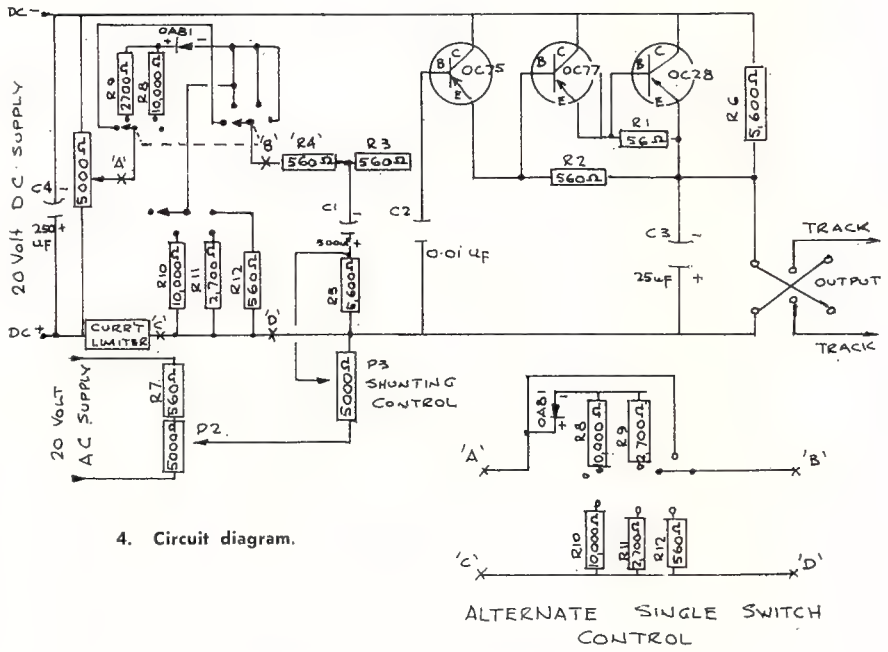
my main pack and the resultant voltage is about 24 volts DC. I found that a standard power pack delivering 16-18 volts did not provide good control with some locos. It was alright on slight grades and level track but the losses in the circuit prevented full performance on steep grades.

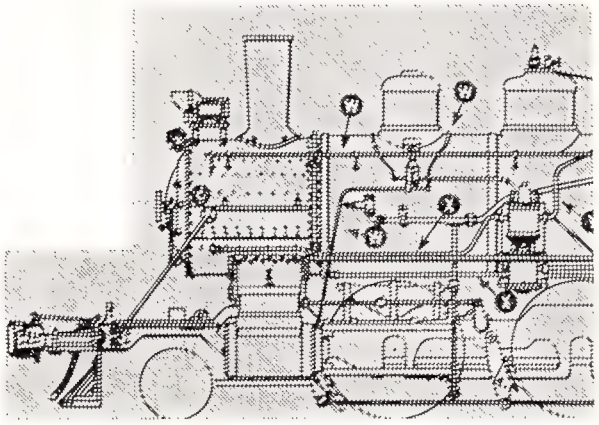


4. Circuit diagram.

For readers who desire to do further reading on the subject of transistors in Model Railroading, I submit this list of publications:

BIBLIOGRAPHY OF REFERENCES ON TRANSISTOR CONTROLLERS

1. J. HANNING: "Transistor Throttle—a practical circuit." Model Railroader, Vol. 27. No. 11. pp. 56-59.
2. L. H. WESTCOTT: "Transistors for Model Railroaders." Model Railroader Vol. 28. No. 9. (Bluebook).
3. L. H. WESTCOTT: "Some Sneaky Faults of Transistor Throttles". Model Railroader Vol. 28. No. 10. pp. 48-9.
4. L. H. WESTCOTT: "Dirt Cutting Hot Spot Device for the Transistor Throttle". Model Railroader Vol. 28. No. 11. p. 54.
5. L. H. WESTCOTT: "Seven Circuits for Transistor Throttles". Model Railroader Vol. 29. No. 1. pp. 58-63.
6. L. H. WESTCOTT: "Getting Closer to Realistic Performance". Model Railroader Vol. 29. No. 2. pp. 56-57.
7. C. T. ELEY: "A New Dimension in Control". Railway Modeller Vol. 13. August, September, October 1962.



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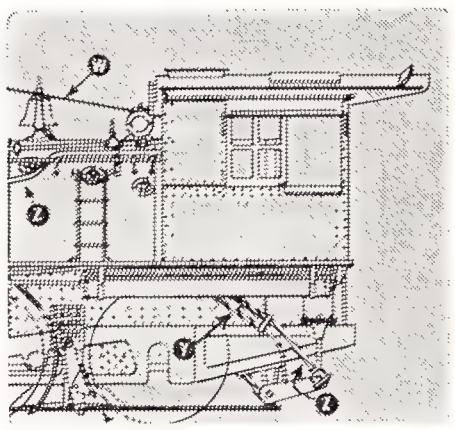

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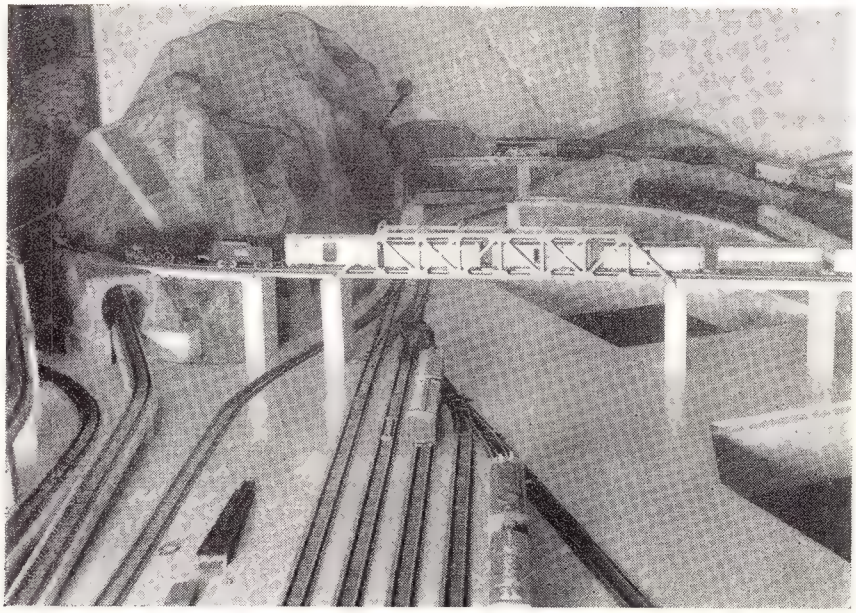
A BEGINNER'S ODYSSEY

by

DON TAYLOR

Being an account of the trials and tribulations of one enthusiast in the construction of his layout.

View from the north looking south.



I FIRST acquired a real model train about 1930, when Santa Claus brought a Hornby clockwork tank loco, some trucks and track. This set eventually passed to a nephew. When Hornby Dublo was first produced, I thought of buying some, but the war put an end to that. Instead of joining the Railway Construction Corps, as did my (older) brother, I chose the R.A.A.F. Missed opportunity! However, I did get to Canada, and saw several of the Southern Pacific cab-forward locos pounding through the Cascade Mountains in Oregon. What a sight!

The massiveness of American and Canadian trains is most impressive, and that is one of the reasons for my eventual choice of North American prototypes for my layout — sorry, pike. Other reasons were that there is more standardisation among makers of American models, and nearly all manufacturers make American type trains.

In 1954, when my child was about three months old, I did suggest to my wife that he should have an electric train: Scornful laugh! But there is nothing like sowing a seed: Christmas 1961 brought a Tri-ang 0-6-0 tank loco, some trucks and track. Two and a half days operation culminated in various troubles which brought the line to a halt.

At this stage I began to read. After about four months, I had the layout on paper and began to build. The layout is a modified version of the Ohio Railroad on page 58 of "Track Design", by Schopp and Carstens. I would not advise anyone to copy my version, as it has too many faults. This was where I ignored the first advice given to beginners, viz. "Don't build too ambitious a layout first." As two boys, aged 9 and 7 are to operate the layout, when they get a chance, it has two separate ovals, and no reversing loops.

It soon became apparent to me that:-

1. Model railroading is a worse disease than golf.
2. There must be a war on somewhere, as everything is in chronic short supply.
3. Model railroading suffers from a shocking lack of standardisation, which would never be tolerated by a prototype line.

I wanted to build a layout which could run tinplate for the children, and scale for me. I soon found that Tri-ang was out of the question as it will not run across points, either universal or scale. This brought me to quality tinplate, or "near-scale", in this case, Fleischmann. This seems to be the best apart from the really expensive scale stuff. I bought a Fleischmann Union Pacific Mikado loco, and a Fleischmann U.P. Metal diesel. For track I bought Peco code 100, and Atlas Customline No. 6 points. Atlas points are very good. Later the 24 inch Sentinel points became available, and I used these in the yard. These are also good, and will handle the seemingly impossible combination, Tri-ang and scale. Peco track is good, but is not N.M.R.A. rail, and some say that N.M.R.A. wheels run better on true N.M.R.A. rail.

To digress for a moment, I was quite surprised by the interest my wife showed in the layout, as construction progressed, and soon found that wives, generally, approve of this model railroad enthusiasm. Is it because:-

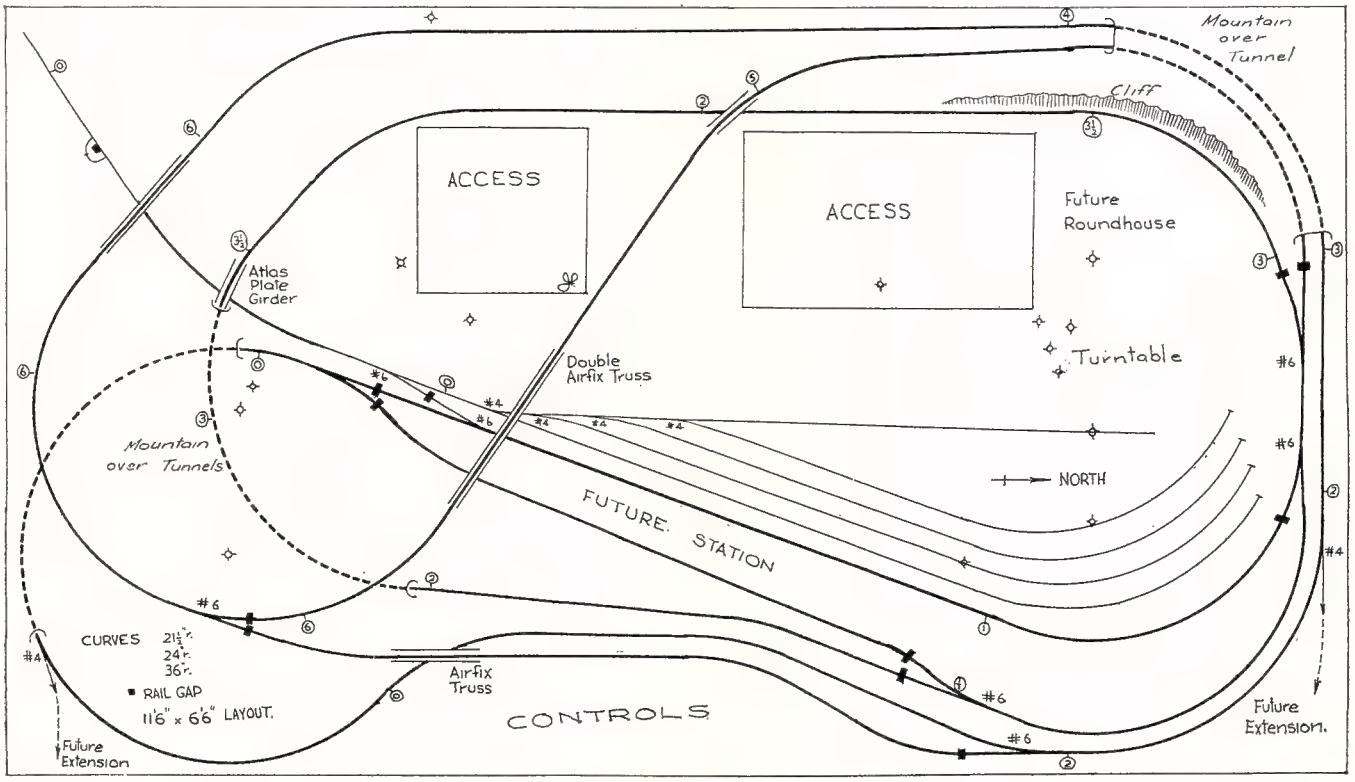
1. They know where we are?
2. They can show the layout to visitors with an air of, "Look how clever my lord and master is!"?
3. They have calculated that it is cheaper than yachts, speedboats, veteran cars, horses, beer, poker machines, blondes, or any of the other hobbies for which we might have acquired a liking?

Construction began in June 1962, and I was certainly surprised at the time it consumed. My former love, my Citroen ID 19, languished forlornly, as my car club friends made pointed remarks about how dirty it was, and my wife complained of its increasing tally of rattles. It suffered the final indignity, when spots of paint from the layout were splashed on its bonnet. However, I pressed on, learning from my mistakes, and what *not* to do next time. At present, I have all the track down, wired, and operating reliably.

The layout is built on a table, 11'9" × 6'6", most of this being covered with ½ inch ply, except for the main lines over the back and sides, which are of grid construction. Screen wire has been tacked to this in preparation for the scenery, and also to prevent the locos from landing on the floor.

There are two cabs for the mainline, and another controller for the yard. The main controller is a Triang, converted to pulse power. Points are operated by Japanese Expressway motors, and Marklin push buttons. (After an unsuccessful effort with a lever frame and fishing line).

The line is not ballasted, the whole woodwork being painted with glossy grey paint. Yes, I know, but it is easy to clean. Can't stand grubby ground. The curves are 21½ inch and 24 inch radius, with No. 6 main, and No. 4 yard points. Having recently bought a Tenshodo 4-8-2, Mohawk, with 12 wheel tender, let



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me here endorse other advice given to beginners: *Stick to 24 inch minimum radius.* The grades are up to 1 in 24, and again I would endorse the usual advice to beginners and keep the grades gentle (1 in 48). More important for running fine scale stuff is the gentleness of transition at a change of grade.

It is remarkable the number of places where a scale loco can produce short circuits when encountering sharp curves or a sudden change of grade.

Another source of bother was couplings. I fitted X2F couplers to the original locos, and bought 2 Athearn box-cars and a caboose, plus 5 of Searle's Japanese box-cars. Using Mantua uncouplers, I had trouble getting them to uncouple in the yards, but could not stop them uncoupling on downhill corners. The couplers also sag, so that they catch on points and cause derailments. Now I know that these matters can be cured, by careful attention to detail, but I like to see my trains moving, not being fiddled with. Next I converted the Diesel back to Fleischmann couplers, and bought four Fleischmann carriages. The reliability of the couplers, plus the ability of the wheels to stay on the track, caused me to buy Fleischmann freight rolling stock.

Remember, the children also use this layout sometimes.

What advice can I give the beginner? Very little, I am afraid, except to warn him against the mistakes I made. I would suggest reading as much as possible, and then sticking to the advice of the experts. To this I would add, buy good quality equipment. One good loco and 6 cars will give more satisfaction than 3 times as much cheap and nasty stuff.

As for the scale or tinplate argument, it seems to depend in the analysis, on the amount of space available. To get locos and rolling stock, build to NMRA standard, operating really reliably, you need, as far as I can see, 30 inch radius curves, No. 8 points, and 1/48 grades. Certainly, No. 6 points are a dubious proposition, in my experience. On top of the tris your track must be carefully and skillfuly laid, and this laying requires experience.

This brings me back to the first point:- Don't build too ambitious a layout first up.

If you are short of space, and must cut down on curves, grades and points, or if the kids are to use it, avoid N.M.R.A. standards, unless you are prepared to spend much time searching for and correcting troubles. For the best combination of price, quality, performance, reliability and smoothness, Fleischmann seems to be the best to me.

You will find that, as soon as you open your mouth in favour of a particular scale or make, someone, or several of them, will jump on you. I have stuck my neck out, and stated what I have found to suit me best, within my limited experience.

Others, operating under similar conditions, have found obviously, that they are suited better by, say, Athearn. If I were starting again I would use Shinohara track and points, as the point frogs can easily be deepened to take Fleischmann flanges. Anyway, these discussions are one of the most interesting things about the hobby.

If you are thinking of starting a layout, get to it; even if you don't particulary like trains, building the layout is relaxing and satisfying. Best of all, you meet a fine bunch of fellows at the club meetings.

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the shop detective (continued)

Had a visit from Keith Cole of Adelaide, Keith is manufacturing kits of Australian prototype rolling stock and very good they are too. Keith has promised to send us sample kits for review. We are looking forward to this treat with relish as it is good to see the local rolling stock available . . . . Paid a visit recently to Ralph Thomas' workshop in Sydney. It's amazing what he is doing, turning down oversize flanges to locos, rewheeling rolling stock and loco's, nursing sick loco's back to health. Suggest you modellers contact Ralph if you have any troublesome equipment, I am sure he can perform wonders . . . . Shinohara fans take note, Searles have received No. 4 and No. 6 slip switches in nickel silver and brass rail. Have not tried them yet, but they look pretty good to me, price in the vicinity of £3 . . . . Had a note from Jim Downes in Townsville — Jim tells me he is concentrating on stocking lines not usually seen in hobby shops, such as Kemtron, Cal-scale, Central Valley, Kadee and Anderson's Code 70 switch kits and track material. Jim is building up a range of Code 70 components . . . . He is also venturing into "O" gauge, will soon have Central Loco Works and Box-Car Ken lines to supplement Kemtron and Bechtold offerings, drop Jim a line for more details.

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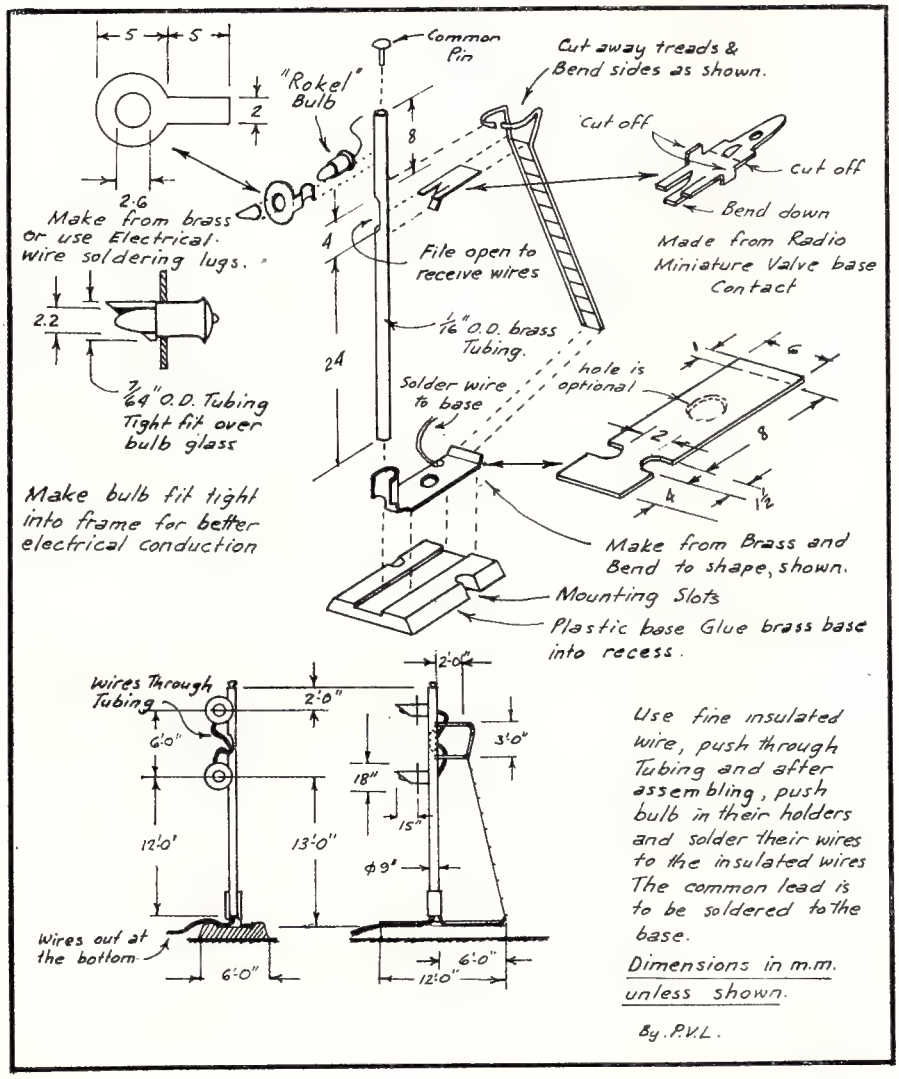
Drawn for 2mm scale by

Paul V. Leuven

Prototype measurements given for conversion to other scales



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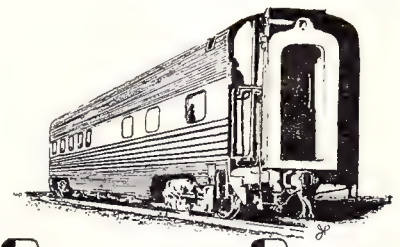
A Reply

Sir,

Regarding the query in helper service for TT buildings I would like to point out to B.F. the Faller range of buildings are not HO scale. They are, in fact, 1:100 scale or TT3, as are most of the continental structures that are available.

I have received from Adur Valley Press the first of a batch of Tueke HOn3½ narrow gauge equipment which I would be willing to lend for review if you are interested.

R. K. RICHARDSON,
Elwood, S3, Victoria.



CLUB CAR

To Club Officers: These pages are available for the dissemination of news about your societies. Brief news about activities will be welcome for these pages. Closing date is fifteenth of month prior to month of issue.

N.M.R.A. ACTIVITIES

Central Division

The November meeting was held at Bob Gillies' home and some operation was seen on his layout. As usual some of his S.A.R. type models came in for some discussion as well as his typical S.A.R. stations. Members discussed some experiences they had on a recent Australian Railway Historical Society trip to Sedan behind some steam locos and a sad return by diesel, from all accounts a memorable excursion. Future meetings: January 22, Dr. M. Wallace, 27 Ontario St., Panorama; February 12, P. Kerry, 24 Holbrooks Rd., Flinders Park; March 11, N. Gully, 8 Lloyd St., St. Mary's; April 11, Saturday, J. Liebelt, "Lieton", Junction Rd., Littlehampton. This April meeting will be a "bring your own" barbeque, starting approx. 2.00 p.m.

Eastern Division

A fine day for the November meeting allowed members to sit in pleasant garden surroundings to discuss Division activities at the home of John Parker at Drummoyne, Sydney.

Tim Moss demonstrated how he constructed trees from small pieces of garden shrubs. John has an excellent layout situated in a special train house at the end of his garden. Members were able to run trains over a well thought out track design.

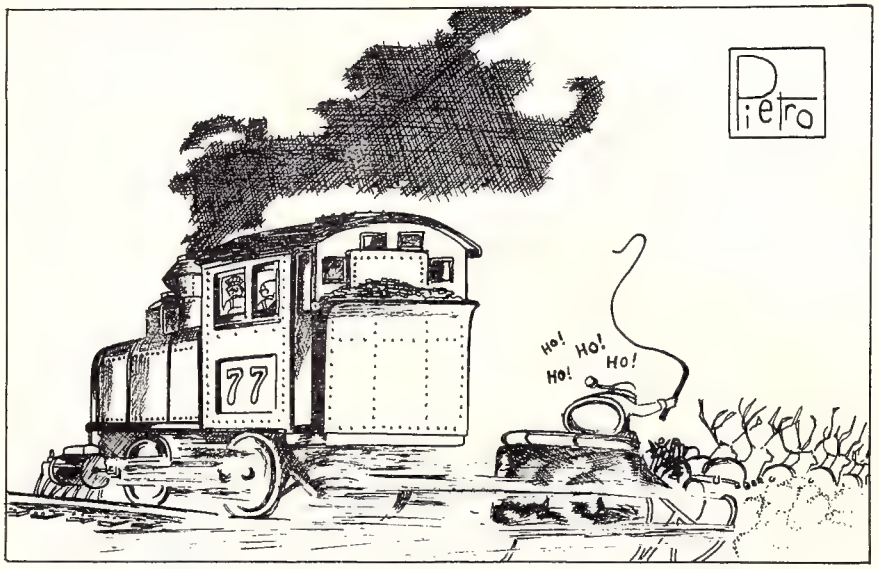
One of the best attended meetings of the year was held on December 7 at Bruce Allcock's home at Hurstville. Twenty-two members were present and his well constructed layout framework was inspected by the visitors.

Only one circle of track had been completed but this enabled his and visiting locomotives to be run. Lyn Russell was able to demonstrate his transistorised throttle. John Wheeler showed an unfinished trestle bridge which is to be a feature on the narrow gauge branch of his layout.

It was gratifying to see a number of new members present.

The next meeting will be held on January 11 at the home of Secretary Garry Lucas, 97 Mona Vale Road, Pymble. On February 8, Frans Persson will be host at 23a Bromley St., Canley Vale. On March 7, Eastern Division members will meet at Ralph Thomas' home, 61 Hewatt Ave., Wahroonga. All meetings at 2 p.m.

SANDBOX SAM



"Monotonous this flat country, Sam. Nothing to see for miles and miles."

Sunshine State Division (Queensland)

The November meeting was held at the home of Mr. G. Gilbey and was not as well attended as was expected. At the Model Railway Exhibition, Frank Freeman stole the show each time he ran his model of the full Southern Aurora on the A.M.R.A. layout. Also present were members from Sydney and Cairns, who put in a fair amount of time on the stand. The number of inquiries relating to club membership was most heartening.

Another Vintage Tram tour was run on the 30th of November to the enjoyment of all and the Division's Xmas party was held on the 14th of December, as it has been previously, at the home of Mr. Dan Sheehan. No date has been set for the first meeting of the New Year as yet, but any interested persons who wish to attend can contact any of the Division Officers listed below who will notify them of the time and place and if necessary arrange transport.

Officers of the Division are as follows:—

Division Representative: Mr. Allan Ward, P.O. Box 189, Newtown N.S.W.

Division Secretary: Mr. Dan Sheehan, 68 Mearns St., Fairfield, Qld.

Division Treasurer: Mr. Alf Tuxworth, 65 Nearra St., Deagon, Qld.

Division P.R.O.: Mr. Gordon Anderson, 6 Yarrala St., Chermside, Qld.

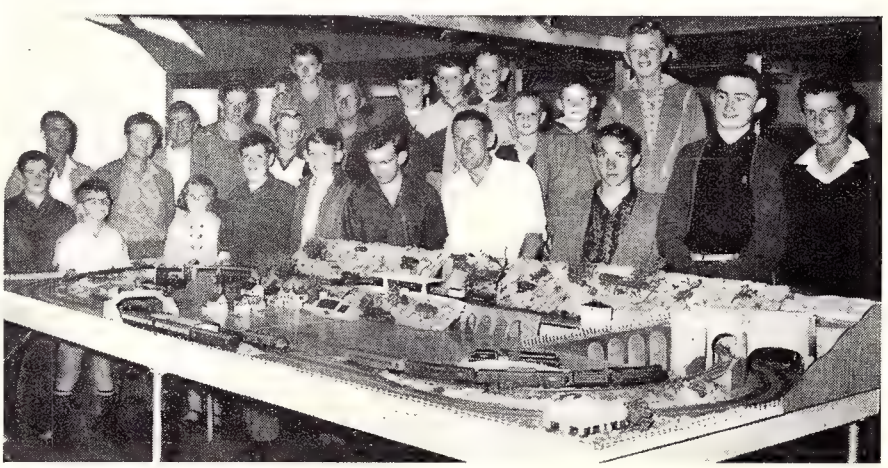
Meetings are held on the second Saturday of each month at the homes of members; visitors are most welcome; any further information available on request from any Officers or Members of the Division.

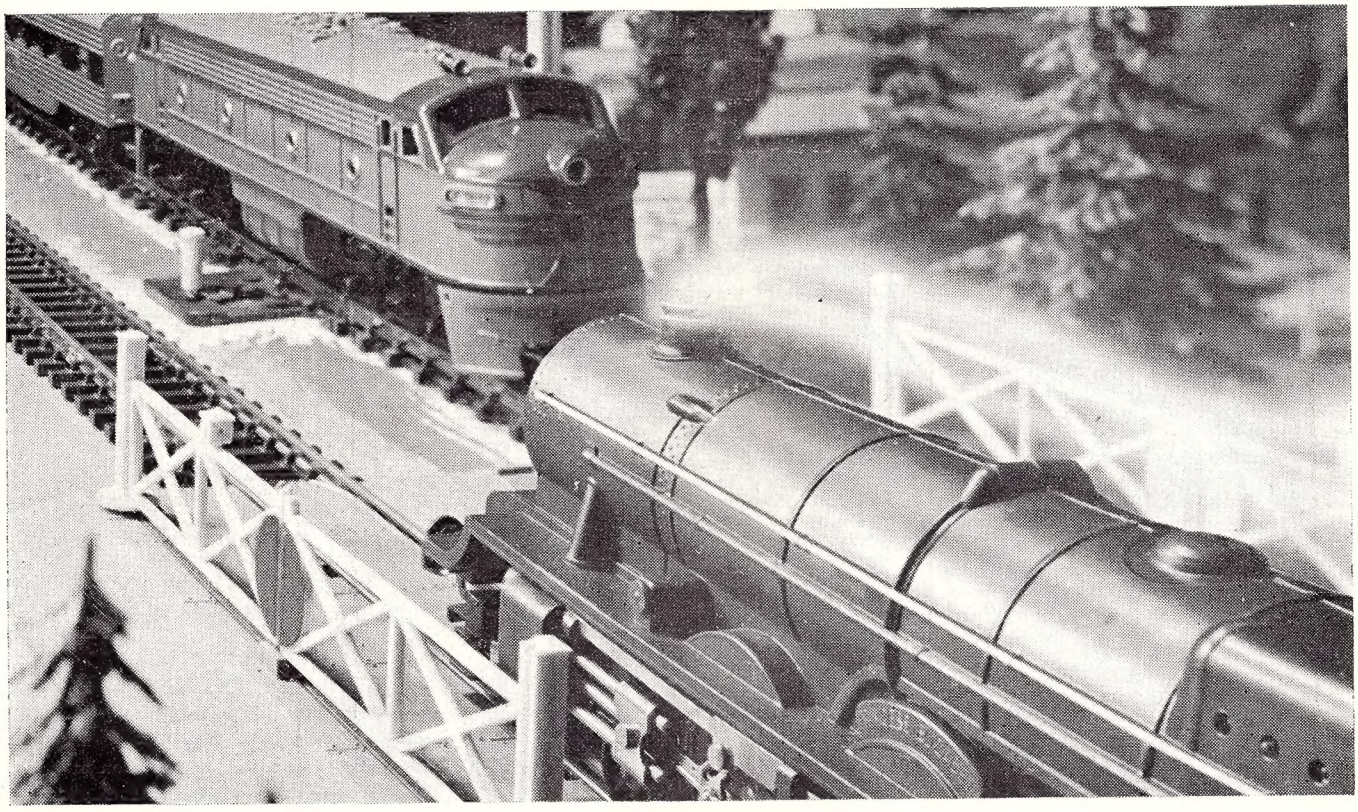
OTHER CLUBS

CENTRAL COAST MODEL RAILWAY CLUB. Hon. Sec.: Leonard H. Dodds, 4 Adelaide St., East Gosford. N.S.W.

With membership steadily on the increase this club seems to be filling a long felt need in this district where members live over a large scattered area. Modellers visiting the district are welcome to call any time to inspect the club rooms. Please contact the Secretary.

The members of the Central Coast Model Railway Club proudly pose with their layout. (Photo Masters Studios, Gosford)





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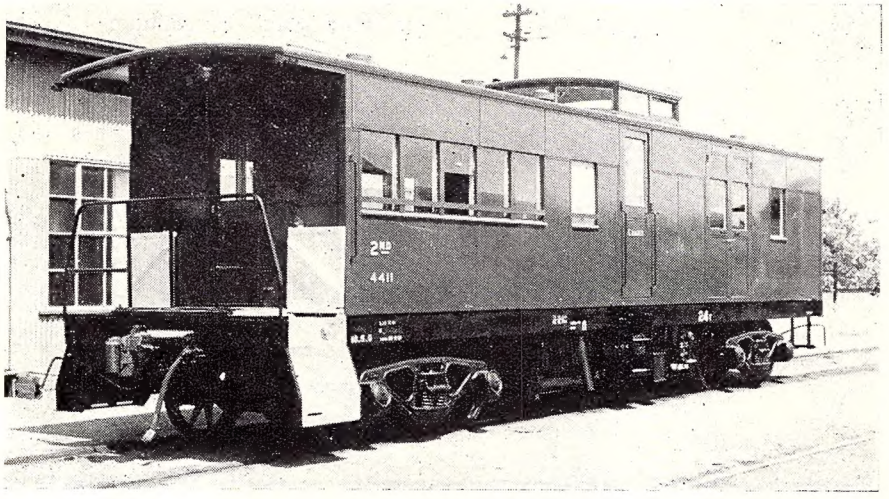
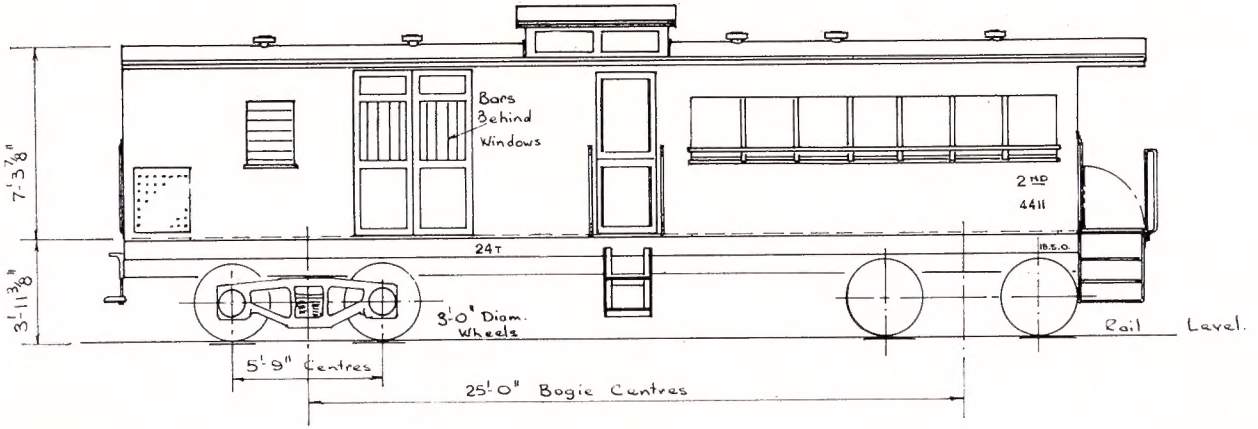
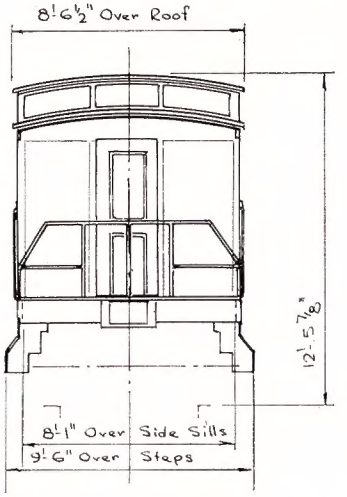


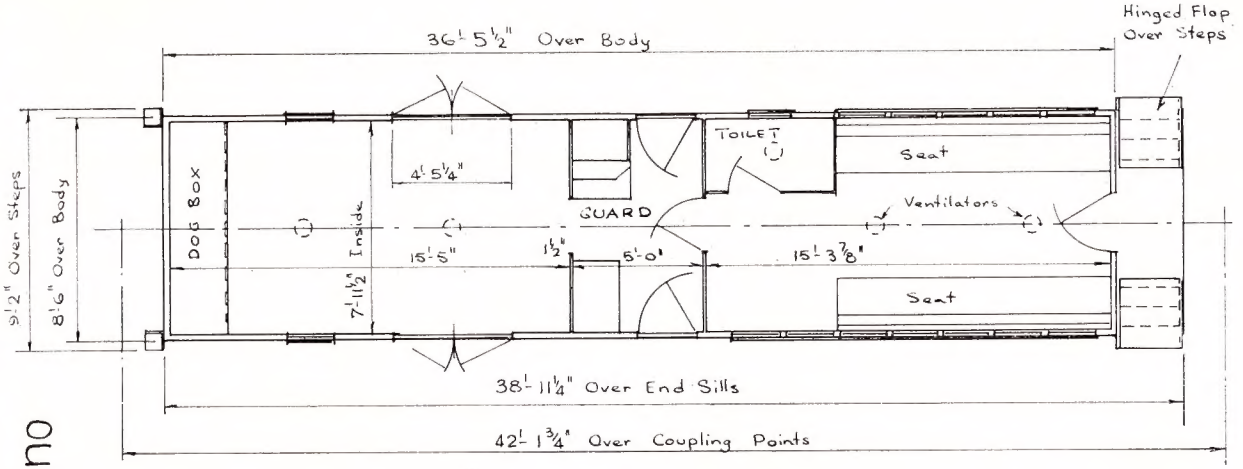
With its cupola-like roof there is a suggestion of the North American railroads in this view of South Australian Railway's composite bogie goods brake van. This vehicle is used on the 5'3" system. Our plan appears opposite.



SIDE ELEVATION



END ELEVATION



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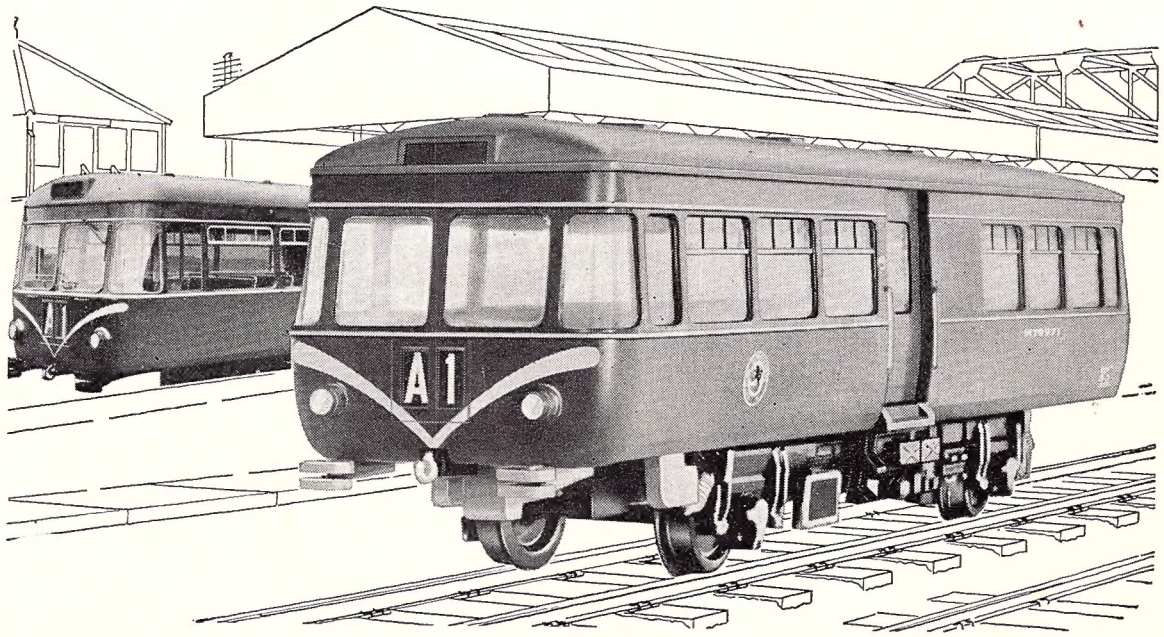

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